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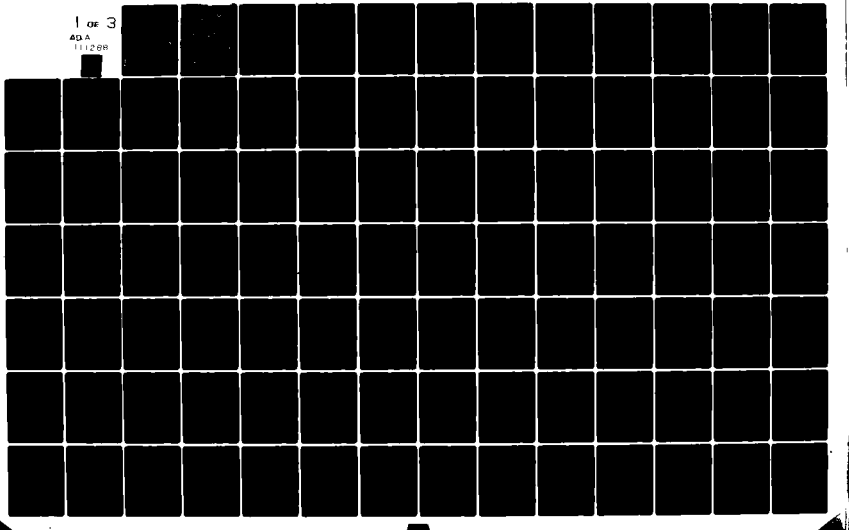

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Dredged Material	Sediment Quality	Water Quality
Confined Disposal Facility	Federal Project	Ground Water
Benthic Organisms	Wetlands	Economics

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Environmental impacts are examined for a Federal permit request concerning dredging and dredged material disposal for Harbor Beach Harbor, Michigan. The document was prepared to address Detroit Edison Company's plan to dredge offshore of the Harbor Beach Power Plant wharf in Lake Huron. Dredging is required to restore adequate navigational depths for vessels deliverying coal to the power plant. Maintenance dredging of the Federal navigation channels at Harbor Beach Harbor by the U.S. Army Corps of Engineers is also discussed.

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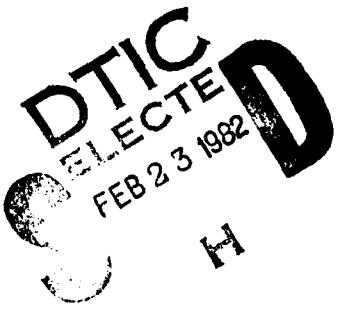
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Draft Environmental Impact Statement

Maintenance Dredging & Dredged Material Disposal Facility at Harbor Beach, Michigan

The Detroit Edison Company Permit Application



Prepared by

U.S. Army Corps of Engineers Detroit District

January 1981

DRAFT ENVIRONMENTAL IMPACT STATEMENT

MAINTENANCE DREDGING & DREDGED MATERIAL
DISPOSAL FACILITY AT HARBOR BEACH,
HURON COUNTY, MICHIGAN

THE DETROIT EDISON CO. PERMIT APPLICATION
(Process No. 792253C)

Prepared by:
U.S. ARMY ENGINEER DISTRICT
Detroit, Michigan

January 1981

SUMMARY

MAINTENANCE DREDGING AND DREDGED MATERIAL DISPOSAL FACILITY
THE DETROIT EDISON COMPANY

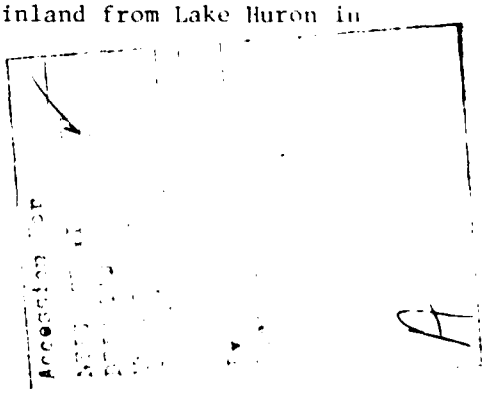
HARBOR BEACH, HURON COUNTY, MICHIGAN

(X) Draft ( ) Final Environmental Impact Statement

Responsible Office: U.S. Army Engineer District, Detroit
P.O. Box 1027
Detroit, Michigan 48231
For Further Information Contact: Dan Allega
313-226-6237

1. Name of Action: (X) Administrative ( ) Legislative

2. Description of Action: The Detroit Edison Company, 2000 Second Avenue, Detroit, Michigan, has made application to the Detroit District, U.S. Army Corps of Engineers, for a Department of Army permit under authority of Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act. This Environmental Impact Statement was prepared by the Corps as the lead Federal agency to fulfill the requirements of the National Environmental Policy Act of 1969 (NEPA) and Department of Army Engineers Regulations 200-2-2, "Environmental Quality: Policy and Procedures for Implementing NEPA", which requires an independent assessment of the environmental impacts that could be expected to occur with the issuance of permits for the proposed actions. Detroit Edison is requesting a permit to perform maintenance dredging in Lake Huron offshore of the Harbor Beach Power Plant at Harbor Beach, Michigan and to deposit the dredged material in a low-lying wetland area inland from Lake Huron in Rubicon Township, Huron County, Michigan.



The dredging would likely be accomplished by using a hydraulic or hopper-type dredge with the material pumped through a hydraulic pipeline into a disposal area, located about 1.5 miles northwesterly of the dredging site.

Discharge of the dredged material would take place in a confined disposal facility (CDF) to be constructed by the Detroit Edison Company. The area designated for this facility is about 65 acres in size, bounded on the west by a natural bluff, on the south by Rapson Road, and on the east by U.S. Highway 25. Containment dikes would be constructed along the northerly, easterly, and southerly perimeter of the disposal area, providing a holding capacity of 1 million cubic yards. The dikes would be constructed of clay obtained from a 22.5 acre upland borrow area, located approximately 100 feet west of the proposed disposal facility. The borrow area could be later utilized for the disposal of fly ash from the Harbor Beach Power Plant.

The purposes of the proposed project are to provide and maintain adequate depths for commercial vessels delivering coal to the Harbor Beach Power Plant and to provide a permanent disposal area for safe storage of the contaminated sediments removed from the harbor at Harbor Beach. The confined disposal facility would also be available to the Corps of Engineers for storing the contaminated materials dredged from the Federally-maintained harbor and channel at Harbor Beach.

3.a. Beneficial Impacts: Beneficial impacts of the proposed project would be realized thru improved harbor draft depths which would insure safe and economical delivery of coal to the Harbor Beach Power Plant which serves electricity needs in Michigan. Existing docking facilities at the Harbor Beach Power Plant would be utilized in a more efficient manner. Disposal of contaminated dredged material in a confined area on land would aid in improving the water quality of Lake Huron in the Harbor Beach area.

b. Adverse Environmental Impacts: The adverse impacts would result primarily from the clearing of approximately 33.3 acres of lowland

forest and the alteration of approximately 17 acres of shrub swamp and 7.5 acres of cattail marsh in conjunction with the construction and subsequent filling of the confined disposal area. Although wildlife habitat would be altered, ponded water contained inside the disposal facility would allow for the reestablishment of some wetland vegetation. Approximately 22.5 acres of farmland would be utilized as borrow pits for dike construction thereby removing this acreage from crop production. Construction and operational activities, including possible use of the proposed borrow pits for fly ash disposal, would involve temporary increases in ambient noise and air pollution levels from the operation of equipment near the disposal site. Dredging operations would cause temporary increases in turbidity within Harbor Beach Harbor. The weir discharge from the proposed confined disposal facility may have the potential of adding ammonia-nitrogen to the ground water in the surficial sands along the discharge channel. If utilized as a chlorinated drinking water supply, such ground water may have an objectionable taste and odor. Design features and a monitoring program to track the discharge effluent should alleviate the concerns over possible ground water contamination. The ground water recharge area for surficial sands in the vicinity would be reduced by 65 acres. Further investigation is planned to evaluate the effects on shallow wells of this reduction in recharge area. Private property located north of the proposed facility could experience a minor rise in flood levels as a result of a stream diversion for the proposed project.

4. Alternatives to the Proposed Action:

   a. Open water disposal
   b. Alternative diked disposal sites
   c. Artificial habitat creation
   d. Placement of dredged material on agricultural lands
   e. No Action.
   f. Alternative Dredging Methods.

5. Comments: Federal, State and local agencies, organized groups, and individuals furnished copies of this Draft Environmental Impact Statement are listed in Section 6.

6. Draft Environmental Impact Statement to EPA: 5 JAN 1981
   Draft Environmental Impact Statement Noticed in the Federal Register:
   Final Environmental Impact Statement to EPA:

PREFACE

The following reports were used in the preparation of the Environmental Impact Statement and accompanying appendices:

1. Terrestrial Baseline Studies of the Proposed Disposal Site, Rubicon Township, Huron County, Michigan, Hazleton Environmental Sciences Corporation (June 1979).

2. Geotechnical Engineering Services, Harbor Beach Dredged Disposal Facility Harbor Beach, Michigan, Harding-Lawson Associates (November 1979).

3. Hydrological Studies Harbor Beach Dredge Disposal Site Harbor Beach, Michigan, Dames and Moore (February 1980).

4. Hydrogeological Report Confined Dredge Facility Near Harbor Beach, Michigan for the Detroit Edison Company, Dames and Moore (July 1979).

These reports which formed the basis for this Environmental Impact Statement contain detailed information concerning the proposed maintenance dredging and dredged material disposal facility. The Corps of Engineers is considered to be the lead Federal agency for preparation of the Environmental Impact Statement for Detroit Edison's Department of Army permit application. Under Corps of Engineers' regulations, Title 33 Code of Federal Regulations, Parts 320-329, the Corps is responsible for preparation of the Impact Statement. The permit applicant is required to furnish the Corps information necessary to allow preparation of the Statement. However, the Detroit District Engineer of the Corps of Engineers has final responsibility for the accuracy of the material presented in the text of the Impact Statement.

It was not possible to incorporate into the Environmental Impact Statement all of the material presented in these reports because of the volume of

information in the reports. However, they are on file and can be reviewed at the following locations:

Department of the Army
Detroit District, Corps of Engineers
477 Michigan Avenue
Detroit, Michigan 48226

Detroit Edison Company
2000 Second Avenue
Detroit, Michigan 48226

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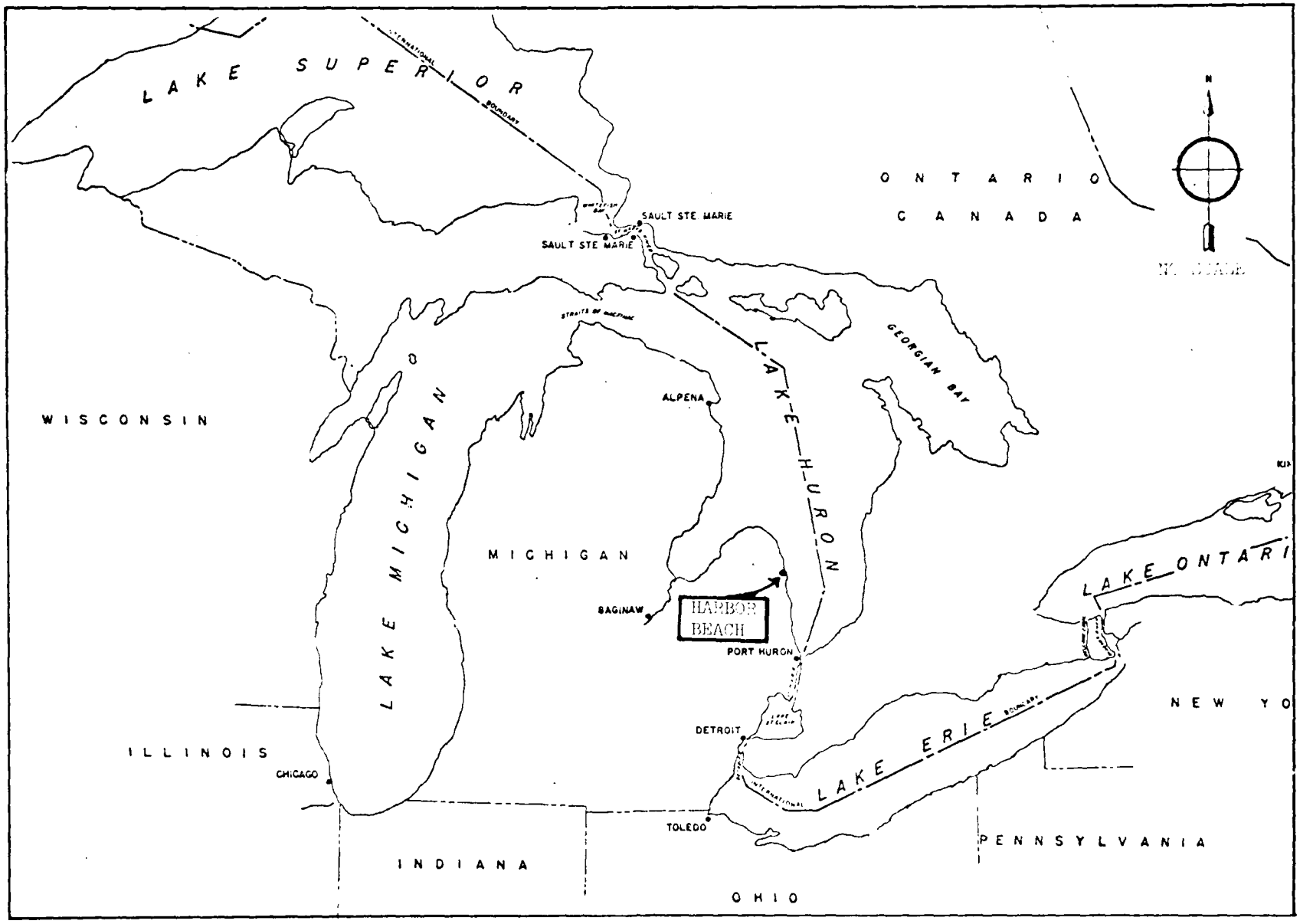
TABLES

FIGURES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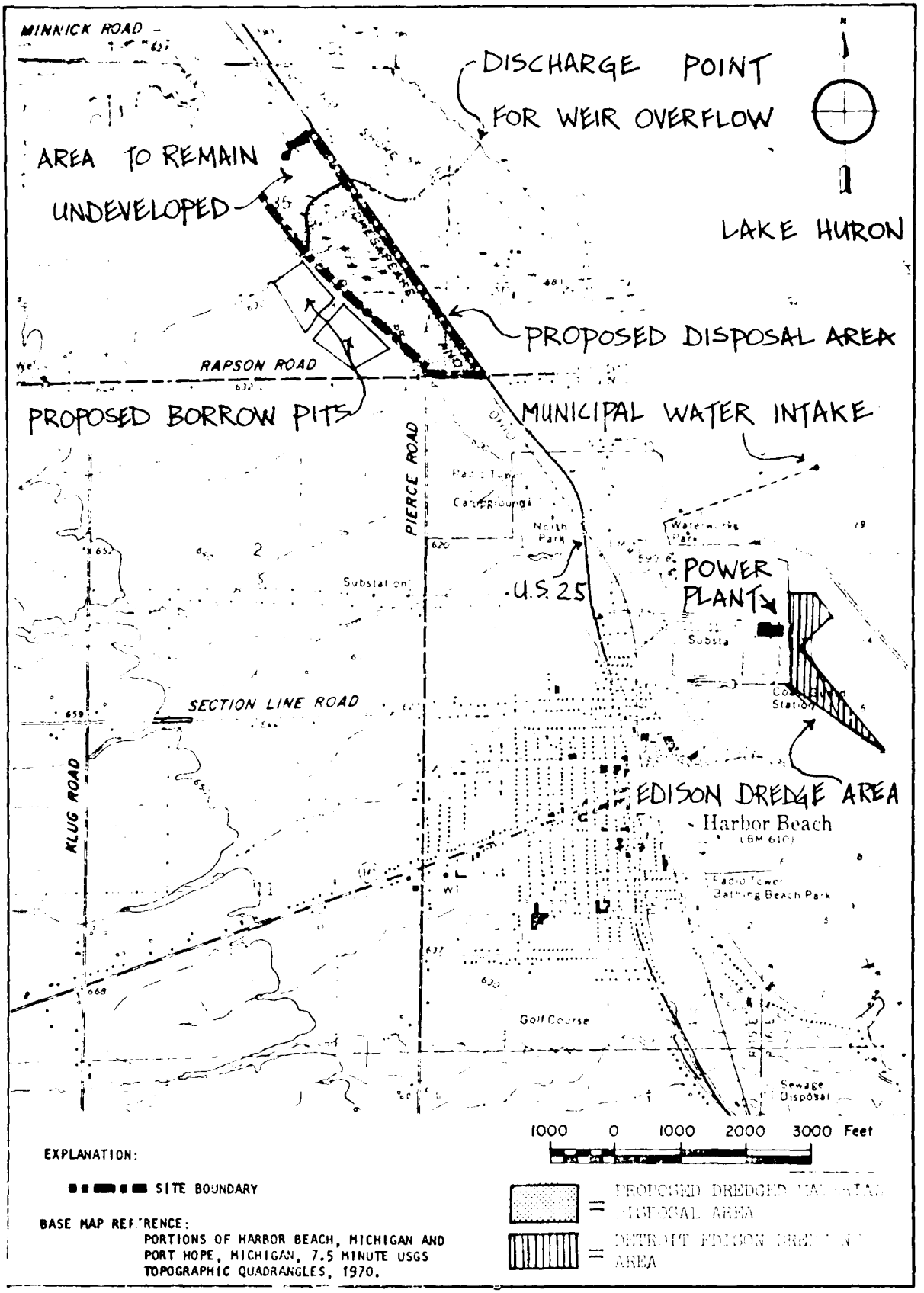
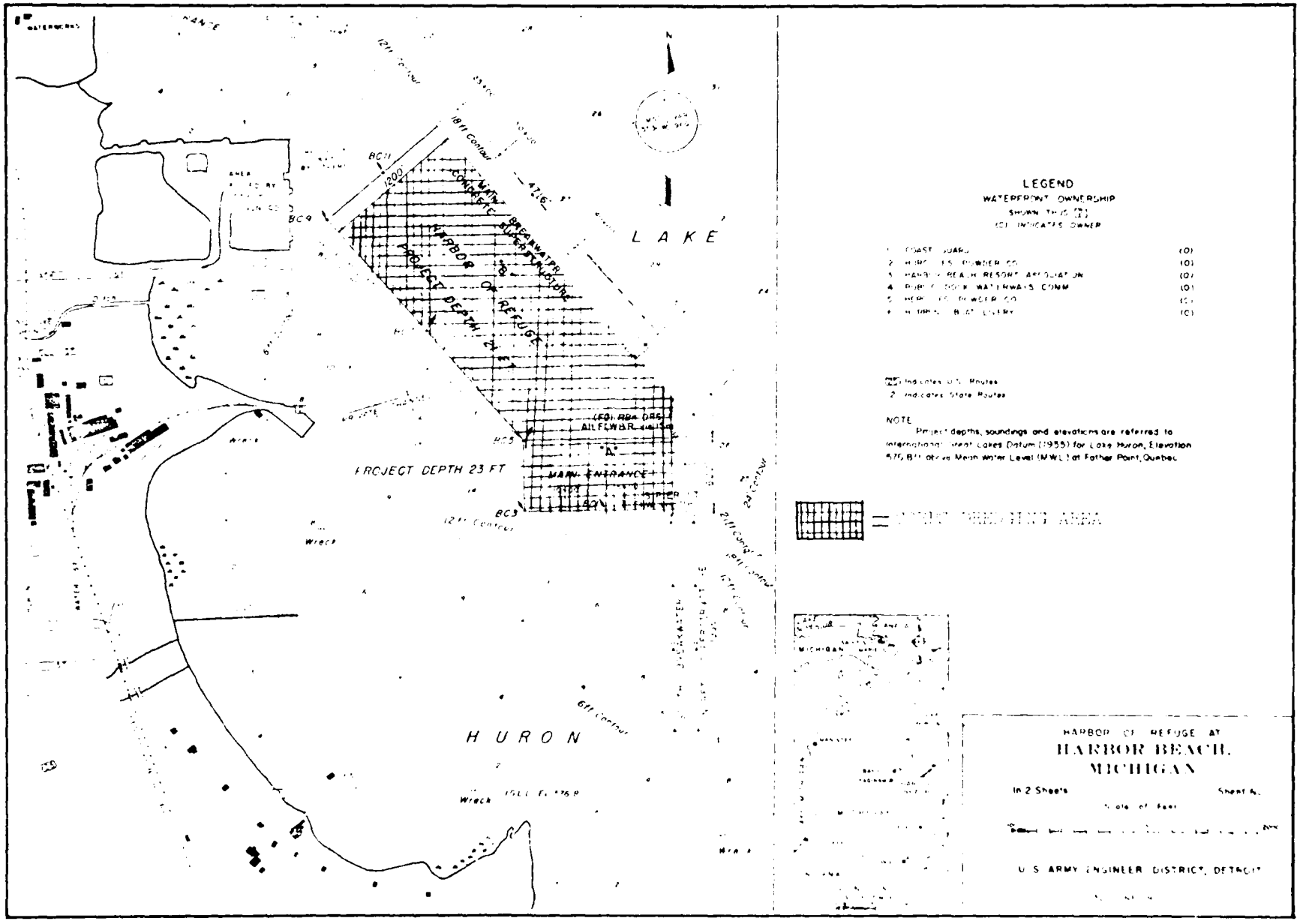


FIGURE 2 - VICINITY MAP WITH LOCATIONS OF PROPOSED FACILITIES


LAKE
HURON
MAIN CHANNEL
BREAKWATER
SUPERSTRUCTURE
HARBOR OF REFUGE
PROJECT DEPTH 23 FT
MAIN ENTRANCE
PROJECT DEPTH 23 FT
BC1
BC2
BC3
BC4
BC5
Wreck
LEGEND
WATERFRONT OWNERSHIP
SHOWN THUS (1)
(O) INDICATES OWNER
1 COAST GUARD (O)
2 HUBC U.S. POWER CO. (O)
3 HARBOR BEACH RESORT ASSOCIATION (O)
4 PUBLIC SOCK WATERWAYS COMM (O)
5 HUBC U.S. POWER CO. (O)
6 H. HARBOR BOAT LIVERY (O)
(1) Indicates U.S. Routes
2 Indicates State Routes
NOTE
Project depths, soundings and elevations are referred to International Great Lakes Datum (1955) for Lake Huron, Elevation 575.81 ft above Mean Water Level (M.W.L.) at Father Point, Quebec
HARBOR OF REFUGE AT
HARBOR BEACH,
MICHIGAN
In 2 Sheets
Sheet No.
Scale of Feet
U.S. ARMY ENGINEER DISTRICT, DETROIT

1. PURPOSE AND NEED FOR THE PROPOSED PROJECT

A. Purposes of the Project

1.01 The purposes of the proposed project are to dredge the harbor area near the Harbor Beach Power Plant and to provide for disposal of the dredged material. The dredging is required in order to permit the safe and economical delivery of coal to Detroit Edison's Harbor Beach Power Plant. Coal carrying vessels are now forced to carry reduced loads of coal and as a result make more frequent deliveries under adverse safety conditions because of the accumulation of sediments in the harbor. An analysis of the existing 1974 and 1978 sediment data (see paragraphs 3.23, 3.24) indicates that the harbor sediments may be unsuitable for open water disposal. Therefore, a containment facility for dredged material is currently proposed.

1.02 Another purpose of the project is to provide the Corps of Engineers a facility for the placement of material dredged from the Federal harbor and channel area at Harbor Beach as required to maintain harbor operating depths.

B. Historical Background

1.03 The Detroit Edison Company serves an area of about 7,600 square miles in Southeastern Michigan. Its customers exceed 1.6 million, and the population served is about 5.0 million. The Harbor Beach Power Plant was constructed in the mid-60's and placed in service in 1967 to enhance a stable and reliable electrical service to the highly agricultural areas of Huron, Sanilac, Tuscola and Lapeer Counties, which collectively comprise the Thumb Area of Michigan. This plant is a coal-fired plant consuming in excess of 260,000 tons of coal annually. The plant relies soley on marine vessel delivery of its coal supplies, which are delivered each year during the regular shipping season. It is a winter peak plant, and its operation requires stockpiling in excess of 125,000 tons of coal on site

prior to the end of each shipping season. Without such coal reserves, the plant would be incapable of continous generation through-out the winter months.

1.04 In the past few years, the Detroit Edison Company has had to resort to half loading all vessels bound for Harbor Beach due to the shallow depths within the harbor. Such practice substantially increases the cost of transporting coal to the plant, and also restricts the maneuverability of these vessels and thereby hampers the ship's ability to safely navigate while in the harbor. If siltation continues within the harbor and/or lake levels decline in the coming years, the Harbor Beach Power Plant will be incapable of providing reliable service to the Thumb Area of Michigan because of the shallow-draft restrictions placed on coal shipments.

1.05 The Harbor Beach Power Plant is located within Harbor Beach Harbor on Lake Huron in Huron County, Michigan. This harbor was originally designed as a "harbor of refuge" for commercial vessels. The harbor is formed by stone-filled, timber crib and concrete capped breakwaters which parallel the shoreline at the southern end and angle toward the shore at the northern end. The U.S. Army Corps of Engineers constructed the harbor breakwater structures and is authorized to maintain a 21-foot depth for navigation in the area of the harbor designated as a Federal Project. Harbor depths outside of the Federal Project near the Power Plant are maintained by the Detroit Edison Company. Figures 2 and 3 show the locations of the Federal Project and the access area maintained by Detroit Edison.

1.06 The Corps of Engineers did not maintain maximum project depths at Harbor Beach Harbor for many years since no demand existed. With completion of the Detroit Edison plant, it became necessary to plan for restoration of project depths. Condition surveys and computations in 1965 indicated about 880,000 cubic yards of material above established grade

in the Federal project area. Considering only the harbor entrance and the westerly 600 feet of the inner basin, an amount of 474,000 cubic yards were above project depth, including one foot of overdraft. This smaller area was dredged by the Government dipper dredge GAILLARD in 1967, resulting in the removal of 192,500 cubic yards. Limitations of funds, loose sediment conditions, and dredge time availability precluded removing all of the above grade material. The excavated material was loaded in scows and dumped in nearby deep water in Lake Huron. In the same year, under permit, the Detroit Edison Company dredged an access area to their dock removing 399,847 cubic yards of material and dumped in the same deepwater disposal area.

C. Need for the Harbor Beach Power Plant

1.07 Detroit Edison's Thumb Division serves the Thumb Area using an essentially square loop, 120 KV subtransmission system. There are four principle inputs that make up the four corners of the system. These inputs are: Hunter Creek Station on the southwest, Lee Station on the southeast, Atlanta Station on the northwest, and Harbor Beach Power Plant on the northeast. Atlanta Station is supplied through an interconnection with Consumers Power Company. The 1979-1980 winter peak demand for the four county area serviced by the Thumb Division was approximately 200 MV.

1.08 When in operation, the Harbor Beach Power Plant is a significant source of power for the area. The availability of the Harbor Beach Power Plant, since placed in service, has also nearly eliminated the probability that the Thumb Division would experience a total loss of power. Due to the strategic location of the plant, if it was unable to operate because coal could not be received, the probability of an overload or low voltage condition in the Thumb Division service area would significantly increase. This is because an imbalance in the Thumb Division's stability would be caused by shutdown of the plant. In addition, the overall reliability of the Thumb Area served would be adversely effected, and temporary power reductions or power outages may result.

1.09 There has been no attempt by Detroit Edison to estimate the economic losses which would arise as a result of unexpected interruptions in electrical service to the customers within this four county area. However, depending on seasonal conditions, such losses could be substantial.

1.10 The Harbor Beach Power Plant provides a substantial portion of the tax revenues collected by the City of Harbor Beach. The 1980 property taxes on the Harbor Beach Power Plant are expected to be approximately $460,000 or roughly 40% of the total property tax collected by the City of Harbor Beach. Based on 1979 property tax rates, the total tax revenue dispersements made by the City would be broken down as follows:

Harbor Beach Schools	50%
City of Harbor Beach	38%
Huron County	12%
	100%

As a result of a prolonged reduction in operation or a shutdown of the Harbor Beach Power Plant, it is expected that approximately 50% of the plant's tax liability would be eliminated. Such a reduction would decrease revenues received by the City of Harbor Beach and the Harbor Beach School System by roughly 20% of current levels based on past tax revenue dispersement trends. Thus, severe cutbacks in City services and educational monies would be expected as a result of the plant shutdown.

1.11 Likewise, the Harbor Beach Power Plant employs 30 operators, clerical and support personnel which would be relocated to other Company installations. These 30 employes comprise an annual payroll at the plant of over $600,000. Of this amount, all or a substantial portion of this payroll, and the buying power it represents, would be lost to Harbor Beach.

1.12 To the Detroit Edison Company, a shutdown of the Harbor Beach Power Plant would result in an increase of the Company's fuel costs and capacity charges. These costs are estimated to be approximately $16.0 million annually and would be passed on to Detroit Edison's customers in the form of higher rates.

1.13 Therefore, it is the opinion of the Detroit Edison Company that the loss of generating capacity at the Harbor Beach Power Plant would not only decrease the reliability and stability of the electric service provided to the northern Thumb Area of Michigan, but more importantly have a significant adverse economic effect on the Company's customers, the City of Harbor Beach, the surrounding community, and the Company.

2. PROPOSED ACTION INCLUDING ALTERNATIVES

A. The Proposed Action

2.01 Plan: The Detroit Edison Company proposes to construct a 55 acre confined disposal facility for material dredged from Harbor Beach Harbor. Approximately 325,000 cubic yards of sediment would be dredged initially from the harbor and placed in the proposed confined disposal facility. It is anticipated that an additional 325,000 cubic yards of sediment would be dredged from the harbor over a ten year period, and these sediments would also be placed in the confined disposal facility. This facility would be made available to the Corps of Engineers for the disposal of material dredged from the Federally maintained channel and harbor areas at Harbor Beach Harbor. Total storage capacity for the facility is estimated to be 1,000,000 cubic yards. The storage capacity needed for Federal dredgings of Harbor Beach Harbor for the next 10 years has been estimated to be 350,000 cubic yards.

2.02 Site Location: The dredged material disposal site is a low-lying wetland area, located approximately 1.5 miles north of the City of Harbor Beach and approximately 2,000 feet from the Lake Huron shoreline. It is

bounded on the west by a natural bluff, on the south by Rapson Road, and on the east by U.S. Highway 25. Materials for dike construction would be obtained from a borrow area located immediately west of the proposed disposal facility. The borrow area is approximately 22.5 acres and is in use as farmland.

2.03 A hopper dredge would probably be used to hydraulically dredge the harbor area adjacent to the Harbor Beach Power Plant. The hopper dredge uses drag-arm suction units to pull material from the bottom of the harbor and pump it into hoppers aboard the dredge. When the hoppers are filled to capacity, the dredge would move to a designated mooring area and pump the material from the hoppers into a pipeline. The pipeline would then transport the dredged material in a hydraulic slurry to the disposal area. Booster pumps may be required to help transport this dredged material, depending on total length of pipeline. If booster pumps are necessary, they would be located on Detroit Edison property. The pipeline size would be determined by the contractor accomplishing the dredging work for Detroit Edison. From past dredging experiences, a pipe diameter of 16 to 18 inches is believed to be the most practical. It is also possible that a pipeline-cutterhead dredge might be used. This type of dredge would pump the dredged materials and water to the disposal site via a floating pipeline across the harbor and then through the overland pipeline to the disposal facility.

2.04 The pipeline route would be located almost entirely on Edison-owned property, including an abandoned railroad right-of-way now owned by Detroit Edison. The only exception is where the pipeline would cross U.S. Highway 25 and Rapson Road. Culverts or trestles would be provided where necessary so that the pipeline would not impact local vehicular traffic or streams. Minor improvements to the existing docking facilities on Detroit Edison property may be required to provide a pump out station where the dredge could connect to the overland pipeline. These improvements would likely consist of mooring piles and a platform structure.

2.05 During disposal operations and following a settlement period in the containment facility, the transport water would be returned to Lake Huron through an overflow wier at the northern-most end of the disposal facility. The volume of water overflowing the weir could be controlled by adjusting the weir opening levels. Detroit Edison would closely monitor the effluent leaving the weir, making sure the water is maintained at an acceptable level of quality. Water flowing from the weir would enter Lake Huron via an existing natural drainage channel. Impounded water would be maintained within the proposed confined disposal facility.

2.06 The confined disposal area would be cleared of all trees and brush prior to dredge slurry placement. Containment dikes would be constructed at the perimeters of the disposal area ("dikes" as used in this Environmental Statement imply "berm" or "containment barrier"). The dikes would be designed with slopes of two foot horizontal to one foot vertical (2:1). An abandoned railroad embankment would be incorporated into the eastern dike to decrease the amount of borrow required. The dike crest would be approximately 12 feet wide and set at an elevation of 605 feet (Mean Sea Level Datum), which would create an average dike height of about 14 feet above the ground surface. Vehicle access would be provided to the dikes from Rapson Road. The flow of an existing intermittent stream at the north end of the proposed disposal area would be redirected around the northern dike. This stream is identified as stream C in figure 7 (page 47). Normal flow from this stream would be accepted by another nearby stream (stream B, figure 7).

2.07 Materials for dike construction would be obtained from two borrow pits to be excavated approximately 100 feet west of the proposed disposal area. These materials would primarily consist of sandy clays and sandy silts. To obtain the estimated 145,000 cubic yards of material to construct the dikes would require both borrow pits to be about four to five feet deep. The southern pit would be about 550 x 1100 feet (plan dimensions) and the northern pit would be about 500 x 750 feet. Berms would be constructed around the borrow pits, and the areas could later be

utilized for the disposal of fly ash from the Harbor Beach Power Plant. If used for ash disposal, a phased filling process would take place over the life of the Plant. The land surface of the filled site would eventually be graded and reclaimed to support vegetation, but final disposition of the borrow site is not presently known.

B. General Alternatives

2.08 The Federal action under consideration is the issuance by the U.S. Army Corps of Engineers of a Department of Army permit for the proposed action, which has been described in the previous paragraphs. There are three alternatives available to the U.S. Army Corps of Engineers:

- Issue the permit as proposed with general conditions in accordance with regulations.

- Issue a permit with restrictions or special conditions.

- Deny a permit for the project as proposed.

2.09 If a permit is granted as requested, the impacts will be those described in the body of this Environmental Impact Statement.

2.10 If a permit with special conditions is issued, the impacts will be generally as described herein, with such differences as may result from the imposed conditions. If a conditioned permit is issued and increased costs develop as a result of the imposed conditions, the applicant may elect to accept the increased costs and continue, abandon the project, or submit a new application with a revised proposal.

2.11 Denial of the U.S. Army Corps of Engineers' permit for the project as proposed would have the same effect as "no-action", discussed in paragraph 2.26.

C. Open Water Disposal of Dredged Material

2.12 Although the harbor sediments have been described as "moderately polluted" by the Environmental Protection Agency (EPA), the possibility of open water disposal has not been completely ruled out. Open water disposal is subject to approval by EPA and the Michigan Department of Natural Resources. Additional tests are being taken by Detroit Edison and the Corps in respective dredging areas. Consultation with the EPA and the Michigan Department of Natural Resources will take place when the additional data is obtained. The most common effects of open water disposal of dredged material are turbidity, sediment buildup, and oxygen depletion. Turbidity can be aesthetically displeasing and reduce light penetration. Depending upon the disposal site, sediment buildup can smother benthic organisms, reduce bottom habitat diversity, and cover vegetation. Oxygen depletion has the potential for suffocating aquatic organisms. The magnitude and duration of these effects can vary significantly depending on the amounts and types of materials involved and the manner in which they are returned to the water.

2.13 Treatment of dredged material to mollify or remove contaminants could make open water disposal acceptable. This treatment could be accomplished by utilizing: (1) local sewage treatment works, (2) separate onshore treatment plants, (3) and on-board treatment prior to in-lake discharge.

2.14 The following example indicates that the treatment of dredged material, although ultimately feasible, would not be practical. Assume the removal of a moderate amount of dredgings; i.e., 1,000 cubic yards of material per day. A 0.5 percent slurry of that amount would be a volume equivalent to the wastewater discharge of 250,000 people. Sewage treatment plants of the area do not have the capacities to treat these additional volumes.

D. Alternative Diked Disposal Sites

2.15 Upland Site Adjacent to the Proposed Site. Detroit Edison Company has considered using the land west of the lowland site for the disposal of dredged material. Land to the west of the proposed site is at a higher elevation and is presently being farmed. When compared with the proposed site, the alternative site has a disadvantageous location for Detroit Edison in terms of construction and operation costs. The upland location would require more pipeline and a greater number of booster pumps than the proposed site. Productive farmland would be encumbered. Detroit Edison has submitted the following information comparing the proposed lowland disposal area to the alternate upland site:

TABLE I

Justification for Lowland Area

	Lowland	vs.	Upland
Cost comparison	1 x total cost	vs.	2.5 x total cost
Smallest amount of new diking	145,000 cu. yds.	vs.	335,000 cu. yds.
Pipeline distance minimized	1.3 miles	vs.	2.5 miles
Weirs minimized	1 weir	vs.	8 weirs
Booster pumps minimized	1 pump	vs.	3 pumps

2.16 Other advantages identified by Detroit Edison of using the proposed lowland site in lieu of the upland alternative site include: minimal dike height, compatibility with existing topography, and existing vegetative cover for visual screening. (For additional site selection information, see appendix page A3-21)

2.17 Description of Sites Corps Has Considered for the Disposal of Dredged Material. The Corps of Engineers has evaluated a number of

sites in the Harbor Beach area for the disposal of Corps' dredgings. These sites are discussed in the 1977 Draft Environmental Impact Statement (EIS), entitled "Harbor of Refuge at Harbor Beach, Michigan, Confined Disposal Facility, Structure Repairs and Maintenance Dredging", prepared by the Corps of Engineers. Some of these sites are listed below. The locations of the sites are shown in Figure 4.

a. Corps Site 2. This site is located on property presently owned by the Hercules Powder Company. Site 2 was considered for use as an interim handling site in conjunction with an upland disposal site such as Site 3. For Corps' dredged material disposal, the City of Harbor Beach would have to obtain a 10-year lease for use of the property. However, the property owner has indicated that the property is not available.

b. Corps Site 3. An abandoned gravel pit situated about 4 miles southwest of the City of Harbor Beach. Construction of a confined disposal facility at this site was the preferred plan addressed in the Draft EIS referenced above. Local concerns over possible ground water contamination and the lack of local sponsorship caused the Corps to eliminate this site from consideration.

c. Corps Site 4. Site 4 is a gravel pit located immediately north of Site 3. The property is presently owned by Detroit Edison and was considered as a final disposal site. The volume available within the gravel pit was considered inadequate for disposal of the dredging volumes anticipated.

d. Corps Site 5. Detroit Edison also owns this site which is about 1 mile north of the City limits and east of U.S. Highway 25. The use of this site would require construction of a diked disposal area, and the dredgings would have to be pumped or trucked to this location. The site would require the filling of what is now a marshland, and therefore, it was not acceptable to the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the Michigan Department of Natural Resources.

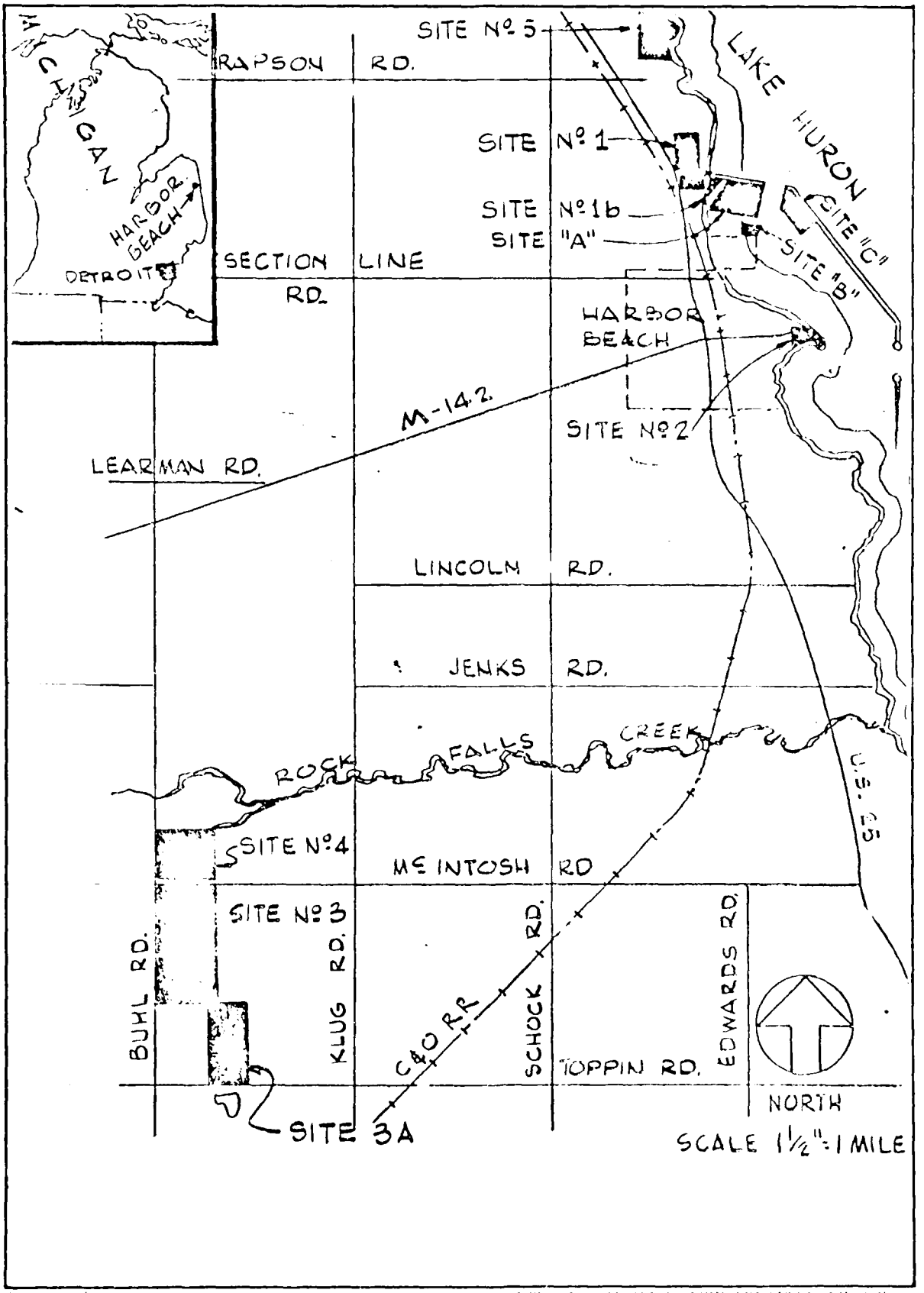


PLATE 1 - EVALUATED DREDGED MATERIAL DISPOSAL SITES PREVIOUSLY INVESTIGATED BY THE CORPS

e. Corps Harbor Sites. Several sites were considered within the breakwater in the harbor. These sites were 1b, A, B, C or combinations thereof. All of these involved the construction of dikes and the filling of this area to a level above the normal water level. These sites received favorable support from local residents. However, because all these sites would require the filling of lake bottomland, they were rejected due to environmental concern and lack of approval by the Department of Natural Resources, the Environmental Protection Agency, and the U.S. Fish and Wildlife Service.

f. Corps Alternative Transportation Methods for the Dredged Material. In conjunction with Sites 1 and 3, alternative transportation methods were considered. The general concept involved dewatering of the dredging slurry at Site 1 and transporting the settled solids to Site 3 by truck. An analysis of shoaling deposits taken from Harbor Beach indicated that the dredged material would be extremely difficult to dewater. These poor dewatering properties would result in large quantities of semi-fluid dredged material to be hauled from Site 1 to Site 3. Economic considerations eliminated truck hauling from Corps consideration due to inadequate volume reduction in the dewatering process and special handling requirements for a semi-fluid material. Economics also eliminated rail hauling because a two-mile spur line would have to be constructed from the existing C&O rail track to Site 3.

E. Artificial Habitat Creation

2.18 Dredged material has been used to create marsh areas and islands in some areas of Michigan. However, whether or not habitat creation would be feasible at Harbor Beach is dependent upon many factors. Some of these factors would include the compatibility of the dredged material with island creation, depth of water, currents, littoral drift, and economics.

2.19 The confined disposal facility being constructed by the Corps at the Pointe Mouillee State Game Area in Monroe and Wayne Counties, Michigan

is a use of dredged material for habitat creation. The Pointe Mouillee disposal area will be an island capable of containing 18,000,000 cubic yards of contaminated material dredged from the Detroit and Rouge Rivers. Location and configuration of the facility is intended to provide a protective barrier against wind-generated wave action as the initial step to reestablish the Pointe Mouillee marsh and to prevent further destruction of the State Game Area. The facility is situated along the line of a previously existing barrier reef which has since been eroded by the wave action of high lake levels.

2.20 The 1974 construction cost estimate for the Pointe Mouillee confined disposal facility was 35.5 million dollars. The Pointe Mouillee facility was designed for 18,000,000 cubic yards of sediment as compared with the 1,000,000 cubic yards of sediment for which Detroit Edison is designing its proposed Harbor Beach confined disposal facility. For Detroit Edison's proposed Harbor Beach disposal facility, an existing bluff and railroad berm would be utilized in the dike design. In addition, the materials for the dikes at the proposed site would be obtained from an adjacent borrow area. Detroit Edison has estimated costs for planned dike construction to be 2 million dollars. If an alternative involving island creation is opted for, it is likely that there would be substantial increases in construction costs. Stronger and more expensive dike materials would be required to withstand the force of wave action. It is possible that an island constructed within the harbor breakwaters could be constructed for less than an island outside of the breakwaters because of the wave protection afforded by the breakwaters.

2.21 The creation of an island could also have potential for recreational marina development. However, dredged material used for the creation of islands would be an unsuitable base for any future building construction due to the long-term, saturated condition of the sediments. The engineering qualities of the material could be improved by utilizing methods of promoting drainage. Some practices that have been used for improving drainage include: ditching, sand drains, vacuum wells, electroosmosis,

ground surface drains, and drainage by desiccation. These methods vary in cost and practicality.

F. Placement of Dredged Material on Agricultural Lands

2.22 One way of disposing dredged material would be to spread the material on farmland. The inherent attractiveness of this alternative is attributable to the ability to dispose of an unwanted product in an environmentally compatible manner while at the same time producing a desirable effect. The desirable effect in this instance would be agricultural improvement by way of increased soil fertility and moisture-retention capacity as well as other physical and chemical effects.

2.23 The application of this concept using dredged material has been the subject of research. One significant research effort was funded by the Philadelphia District of the Corps of Engineers and accomplished by the Soils and Crops Department of Rutgers University. In this effort, dredged material from the Delaware River was added in several different concentrations to five different natural soils in New Jersey which varied from loam through sandy loam to fine sand. Under controlled conditions, crops including wheat, sweet corn, sweet peppers, forage, and others were grown on the dredged material enriched soils over a two-year period. As a result of the experiments, it was concluded that (a) clear and definite beneficial effects were demonstrated, (b) some yields from the originally poorer soils were increased up to 100 percent with proper pH control and fertilizer application, (c) originally better soils were neither improved nor degraded by dredged material addition, (d) dredged material applications of 200 tons per acre could be effectively applied, and (e) the dredged material did not have sufficient concentrations of pollutants that might be toxic with regard to plant growth and no toxic reactions were observed, although measurably higher concentrations of certain elements, notably zinc and manganese, were observed in plant leaves. The derived benefits were attributed to changed percolation rates, aeration, textural characteristics, moisture-holding qualities, cation exchange capacity, pH

organic content, clay mineral distribution, and other effects caused by the dredged material. Regardless of how encouraging these results may be, they must be viewed in proper perspective. The study involved only one type of dredged material as applied to a limited range of soil characteristics; therefore little from this study can be directly extrapolated to other areas or conditions.

2.24 A detailed study of the application of dredged material to agricultural lands was completed in 1978 by the Corps Waterways Experiment Station, located in Vicksburg, Mississippi. Findings of this study were presented as part of the Dredged Material Research Program in a report entitled, "The Agricultural Value of Dredged Material," Technical Report D-78-36, July 1978. The basic conclusion of this report was that dredged material can be used for agricultural production or for an amendment to nonproductive soil.

2.25 In 1978 the Corps made inquiries to the Environmental Protection Agency (EPA) about using the dredged material in the Harbor Beach harbor for agricultural purposes. The EPA responded with a letter dated 8 September 1978 (see appendix page A1-21). This letter indicates that the application of dredged material to farmland could be feasible providing application rates are controlled and potential effects are monitored. However, the Corps has encountered local public opposition on previous occasions in the Harbor Beach area concerning use of the dredged material for agricultural purposes. One of the major reasons for this opposition has been the unwillingness of land owners to accept dredged material in a saturated condition. Concern has also been expressed about the runoff of water from the dredge slurry.

G. No Action

2.26 Unless feasible methods are found for the disposal of dredged materials, the harbor area adjacent to the Harbor Beach Power Plant could not be dredged. The delivery of coal by ship would eventually become

impossible or economically impractical. "No action" could necessitate barge or truck transport of coal or conversion to a different type of fuel. These options are not considered viable due to the economic investments already made at the Harbor Beach Power Plant. Barge transport would require that cus')m designed barges be procured. Substantial capital outlays would be required to unload the barges. Trucking is not viewed as an acceptable method because of the complications of hauling over long distances and the additional handling costs involved. Rail transport of coal is also considered impracticable due to handling costs.

2.27 If an area is not found for the disposal of Corps dredgings from Harbor Beach Harbor, dredging of the harbor would not be performed. An accumulation of sediments in the Federal project area of the harbor would eventually result in an unnavigable harbor for coal carrying vessels.

H. Alternative Dredging Equipment

2.28 An alternative to using a conventional hopper dredge or a hydraulic dredge would be to use specialized dredging equipment. Specialized equipment has been designed to minimize turbidity (water cloudiness) resulting from dredging action. The costs of utilizing such equipment may be justified in areas where sediments contain highly toxic materials. Harbor Beach sediments have been characterized as "moderately polluted" according to Environmental Protection Agency criteria. The sediments are not considered to be toxic because they have not been found to contain elevated levels of heavy metals, PCB, or PBB. Therefore, the degree of adverse impacts resulting from the dredging at Harbor Beach Harbor would not warrant use of specialized equipment.

2.29 There are various types of new dredging equipment discussed in a Corps Waterways Experiment Station report, entitled "Disposal of Dredge Spoil", Technical Report H-72-8, November, 1972. Some of the new dredges involve the use of vacuum and pressure controls. One type of dredge is

referred to as "pneuma". It is an air-lift type of dredge of Italian manufacture which appears to minimize turbidity.

2.30 Mitigation. Department of Army permits can be conditioned to include measures for lessening (mitigating) or preventing some adverse environmental impacts. Weir monitoring, well monitoring, and mosquito abatement are examples of mitigative measures which could be included as part of a granted permit request. Costs for accomplishing mitigation would be borne by the permit applicant.

3. AFFECTED ENVIRONMENT

A. General Introduction

3.01 The proposed Detroit Edison dredging area fronts the Harbor Beach Power Plant between the Plant and the limits of the Federally maintained channel. The proposed dredged material disposal site is located approximately 1.5 miles north of the City of Harbor Beach and approximately 2,000 feet from Lake Huron. Materials for dike construction would be obtained from a borrow area located immediately west of the proposed disposal facility. The borrow area is approximately 22.5 acres and is in use as farmland. This farmland was cultivated during 1980.

B. Description of the Disposal Site

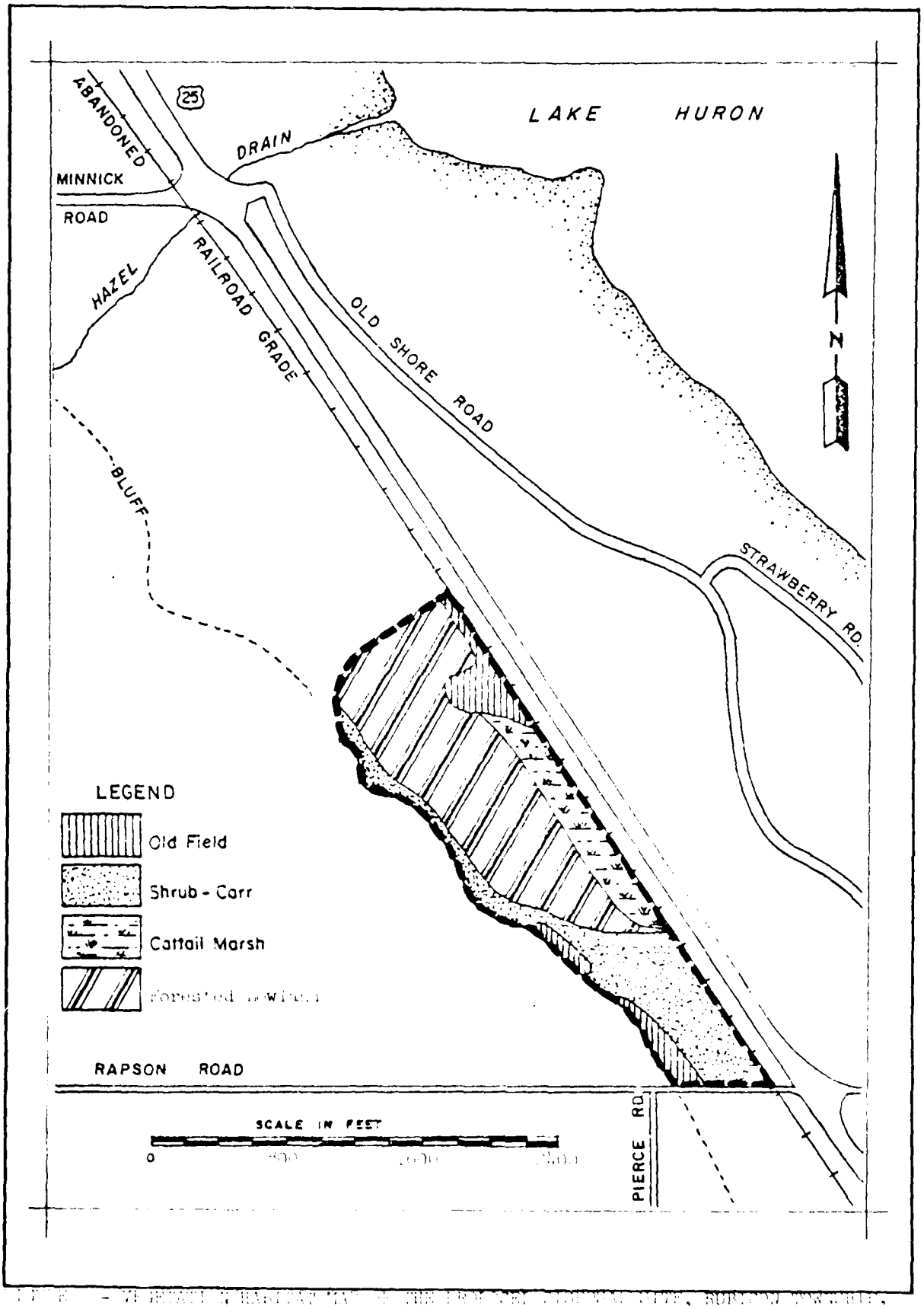
3.02 The site for the proposed confined disposal facility, which is approximately 2,000 feet inland from Lake Huron, is a low-lying area about 65 acres in size bounded on the west by a natural bluff, on the south by Rapson Road, and on the east by U.S. Highway 25. Hazleton Environmental Sciences Corporation conducted a one-year field survey in 1978 for Detroit Edison to identify and describe the ecological communities of the site. A report of survey findings was subsequently prepared and submitted to the Detroit Edison Company on 22 June 1979. Information from the Hazleton Report together with observations made by Corps

personnel at the site were utilized in writing the following paragraphs on vegetation and wildlife. Technical studies of the proposed disposal area have been completed for Detroit Edison by Dames and Moore, Inc. and by Harding-Lawson Associates. Paragraphs describing soils, ground water, and surface water utilize these studies.

3.03 Vegetation. The proposed disposal site occupies a physiographically low, often-flooded area which is presently unsuited to agriculture because of seasonal inundation, a condition that may have partially resulted from man's alteration of drainage. The existing vegetation consists of three successional vegetation types in varying stages of recovery following clearing and grazing (see Figure 5). This vegetation is typical of natural growth on wet and moist sites in Southeastern Michigan.

3.04 Forested lowland, consisting of almost pure green ash in the upper story, occupies more than half of the site. The sparse lower story of common wet-site species is poorly developed because of low light penetration at ground level and the depth of standing water in all seasons. The second most prevalent habitat on the disposal site is shrub-carr, a successional community of wet sites that is dominated by a shrub canopy of red-osier dogwood and green ash. The ground layer consists of bluegrass, goldenrod, and wet-site sedges. The third most prevalent habitat on the proposed disposal site is a cattail marsh that has been maintained in this early stage of secondary succession by herbicide application to remove woody vegetation for transmission line maintenance. The marsh contains a dense stand of the two common cattail species. A minor successional community, old field, occurs in a few small locations. Old field is very similar to shrub-carr, but occupies drier sites and contains more mesic ground layer species. Occasional individuals of quaking aspen, paper birch, and other mesic species of the aspen-birch association occur along the bluff that marks the western boundary of the proposed disposal site.

3.05 Wetlands and Wildlife. Wetlands are defined as those areas that are inundated or saturated by surface or ground water at a frequency and


LAKE HURON
ABANDONED
MINNICK
ROAD
25
DRAIN
HAZEL
RAILROAD GRADE
OLD SHORE ROAD
BLUFF
STRAWBERRY RD.
N
LEGEND
Old Field
Shrub - Carr
Cattail Marsh
RAPSON ROAD
PIERCE RD.
SCALE IN FEET
0

20

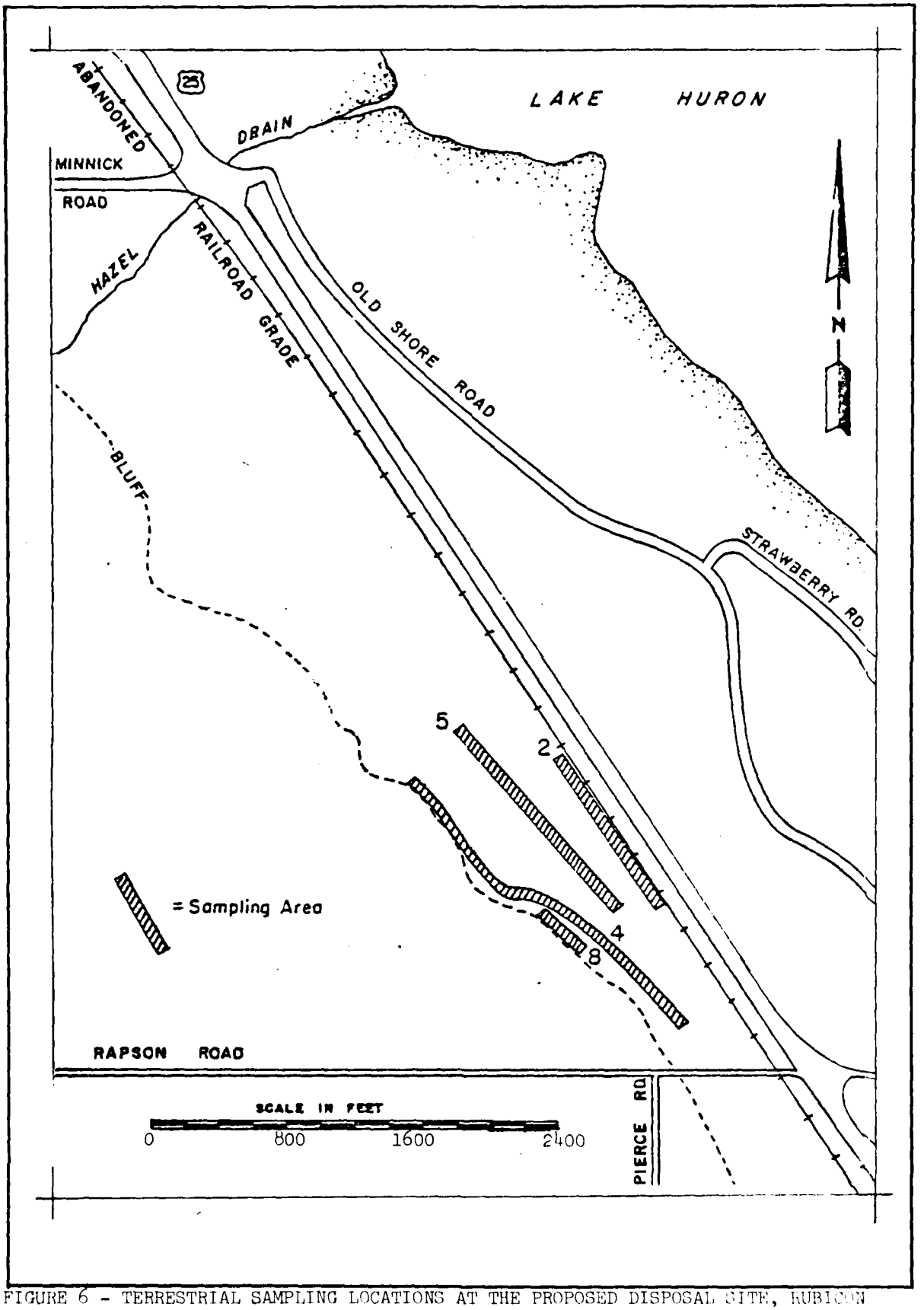


FIGURE 6 - TERRESTRIAL SAMPLING LOCATIONS AT THE PROPOSED DISPOSAL SITE, RUBICON TOWNSHIP, HURON COUNTY, MICHIGAN

duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Title 33 CFR 323.2). Wetlands generally include swamps, marshes, bogs, and similar areas. Using the above Federal definition, the majority of the proposed disposal site can be described as consisting of wetland. Technically, only the area identified as "old field" in the previous paragraph would be excluded from wetland classification. Table 2 (below) lists the acreage of vegetation types found within the boundary of the proposed confined disposal facility.

TABLE 2

Areal Extent of Vegetation Types

Forested Lowland (Seasonally flooded basin or flats, Type 1 Wetland, "U.S. Fish and Wildlife Service Circular 39")	33.3 acres
Shrub-Carr (Shrub swamp, Type 6 Wetland, IBID)	17.0 acres
Cattail Marsh (Inland shallow fresh marsh, Type 3 Wetland, IBID)	7.5 acres
Old Field	7.2 acres
Total	65 acres
Wetland Total =	57.8 acres
Upland Total =	7.2 acres

3.06 The U.S. Fish and Wildlife Service has developed a new classification system for wetlands which is described in the publication entitled, "Classification of Wetlands and Deepwater Habitats of the United States", Cowardin, et al., December 1979. Using this classification, wetlands at the project site would fall under the Paulustrine system. The forested lowland could be described as Forested Wetland with broad-leaved deciduous vegetation; the Shrub-Carr area would be included in the Scrub-Shrub Wetland class with broad-leaved deciduous vegetation; and the cattail marsh could be considered as Emergent Wetland with persistent vegetation. It is important to note that the majority of the site is seasonally flooded or saturated with water. The site was observed to have very little standing water during a site visit made in late July, 1980. Based on a 3 June 1980 site investigation, representatives of the U.S. Fish and Wildlife Service estimated that approximately 90 percent of the proposed disposal site was wetland.

3.07 During the Hazleton wildlife survey conducted in 1978, wildlife species in the forested area included gray squirrel, fox squirrel, raccoon, and white-tailed deer. Three small mammals were captured in the area including short-tailed shrew, white-footed mouse, and meadow vole. A total of 45 avian species were recorded in the forest.

3.08 The wildlife associated with the shrub-carr habitat was the most diverse sampled at the proposed disposal site. Larger mammalian species included eastern cottontail, woodchuck, gray and fox squirrels, raccoon, and white-tailed deer. Four species of small mammals were captured during June and September: short-tailed shrew, white-footed mouse, meadow vole, and meadow jumping mouse. There were 52 avian species recorded in the shrub-carr. Debris and a variety of microhabitats provide excellent habitat for reptiles and amphibians.

3.09 The cattail marsh was relatively small in area but provided habitat for several wildlife species. Larger mammalian species included muskrat, raccoon, and white-tailed deer. Only two small mammal species were

captured: short-tailed shrew and meadow vole. A total of 18 avian species were observed utilizing the cattail marsh habitat.

3.10 In summary, a total of 7 herptile, 85 avian, and 13 mammalian species was recorded on the proposed disposal site. This diversity of species is attributed to the variety of nonagriculture cover types, most of which are characteristic of seasonally inundated areas in Eastern Michigan. No endangered or threatened wildlife species were recorded at the proposed disposal site.

3.11 Near the western boundary of the proposed disposal site there is a nearly circular pond, approximately 60 feet in diameter. The small pond is referred to as "Deer Pond" by local residents and it is reportedly spring fed. According to local residents and representatives of the U.S. Fish and Wildlife Service, deer utilize the site and there are many deer-auto encounters along U.S. Highway 25 near the proposed project site.

3.12 Description of Adjacent Lands. There are approximately 10 acres of forested lowland, owned by Detroit Edison, which are located adjacent to the north boundary of the proposed confined disposal facility. This acreage is considered to be a forested wetland of the same type as described in paragraph 3.05. A private residence and driveway are situated north of the Detroit Edison property limits. The driveway extends from U.S. Highway 25 to the residence located on top of the bluff. Privately-owned land between Detroit Edison's northern property line and the driveway consists of approximately 22 acres. Included on the private land are a woodlot of approximately 5 acres which adjoins the forest on Detroit Edison's land, a small pond approximately 2 acres in size, and approximately 15 acres of grassland pasture. Farmland is located west of the proposed dredged material disposal facility. The eastern boundary of the site is formed by a railroad berm and U.S. Highway 25, and the southern boundary is Rapson Road. In general, the area in the vicinity of the proposed facility is rural.

3.13 Soils. Several soil borings have been taken at the proposed site. The surficial soils encountered by the borings were fine to medium sands containing varying amounts of silt and minor amounts of coarse sand and gravel. These sands are probably beach deposits in origin. The thickness of these surficial sands varied from 2.5 feet in the southeast end of the site to approximately 7 to 8 feet in the central and northeast parts of the site. Beneath the surficial sands and extending to bedrock, there is a layer of till consisting of silty clays and clayey silts with varying amounts of sand and gravel interspersed in a clay matrix. The depth to bedrock in the site varied from 17.5 feet in the southeast part of the site to 40 to 41 feet in the center and northwest parts of the site.

3.14 Ground Water. Ground water in the site area occurs in the upper, surficial sands, in the randomly distributed and discontinuous sand and gravel pockets in the till, and possibly in the joints and fractures of the underlying bedrock. The fine grained portions of the lacustrine silts and clays of the till act as an aquiclude. That is, their ability to transmit water is so low they cannot be considered to be a source of water for wells.

(1) Surficial Sands. The water in the surficial sands is perched on the underlying till. Depth of ground water in these sands is generally less than 10 feet and is often less than 5 feet. The sand deposits are relatively fine grained, have a low transmisivity, and are essentially flat lying, thus the hydraulic gradient is fla From this setting, it can be inferred that the ground water flow rates are very slow. The surficial sand is recharged by direct infiltration from rainfall.

Based on the geology of the area and on published mapping of the surificial soils (U.S. Department of Agriculture, Soil Conservation Service, 1980, Soil Survey of Huron County, Michigan: Covert-Tobico complex and Pipestone-Tobico-Adrian complex), the thin surficial sand deposits present throughout most of the site originally formed a continuous cap extending from the bluff to the Lake Huron shoreline. The

ground water in these surficial sands would have drained northeastward from the bluff area to the Lake. It is suspected that during the construction of the fill for U.S. Highway 25 and/or the railroad embankment that the sands were at least partially removed and the fills for either or both the highway and the railroad embankment are resting on the underlying till. This would then explain the blockage of the aquifer and result in the condition seen today of the ponding of water on the west side of both these embankments.

According to the Harding-Lawson Associates' study, the sand layer does not represent a good, potential source for potable water, unless it is treated to assure drinking quality standards. Since these sands are recharged by direct infiltration, this aquifer unit is subject to contamination from decaying organic material in the ponded areas on the west side of U.S. Highway 25, contamination from seepage from barnyard areas, and contamination from fertilizers used in the cultivated areas. Also, the gradation and thickness of the sand are such that only low yield wells are possible.

Nevertheless, there are residences along Old Shore Drive between the proposed disposal site and Lake Huron which utilize ground water for domestic supplies. The depth of private wells is not known, but some are believed to be shallow.

Reported springs in the area most likely occur where the surficial sands have been breached and the perched water either fills a depressional area or seeps into an adjacent drainageway.

(2) Sand and Gravel Pockets in Till. The discontinuous sands and gravels in the till may be a source of water for low yield wells. Recharge to these discontinuous sand and gravel pockets is through the slow infiltration from the relatively impervious till. Wells developed in such sand and gravel pockets generally are limited in quantity and have a history of going dry during periods of heavy pumpage.

(3) Bedrock. Only low yields of ground water would be anticipated from the joints and fractures in the bedrock. Water which is present in the bedrock is recharged through the slow infiltration from the overlying and relatively impervious till.

3.15 In the upper sand and silt layer, the ground water velocity is 2.5 x 10^{-5} to 2.5 x 10^{-6} cm/sec, using an estimated permeability of 1 x 10^{-3} to 1 x 10^{-4} cm/sec, a gradient of 10 feet over the 1,320-foot width of the proposed site, and a porosity of 30 percent. In the underlying silt and clay, the velocity is 1.4 x 10^{-8} cm/sec. After multiplying the velocities by the cross-sectional areas and adding, the total ground water flow rate is 3.0 x 10^{3} to 2.9 x 10^{4} m^3/yr (7.9 x 10^{5} to 7.7 x 10^{6} gal/yr). These calculations indicate that the ground water flow rates are relatively low.

3.16 Dames and Moore, one of the consulting firms contracted by Detroit Edison, has analyzed ground water samples from two borings taken near the proposed disposal site. One boring was taken east of the proposed site on Old Shore Road, and the other was taken west of the proposed site on Rapson Road. The samples were taken monthly for a 5 month period. Table 3 (page 28) lists the average and range of each parameter analyzed, and it gives an indication of the present composition of the ground water.

3.17 Surface Water. Surface water in the vicinity of the proposed site consists of four intermittent streams and several areas of ponded water. These streams generally flow from west to east parallel to the northern border of the proposed site. The relatively impermeable soils in the area prevent significant infiltration. Consequently, drainage of the area consists mainly of runoff. Ground water contribution to stream flow is small. Thus, the streams in the area are subject to excessive flows during periods of snowmelt and heavy precipitation, but otherwise sustain only very low base flows. Many of the cultivated fields west of the proposed confined disposal facility are artificially drained, which accelerates the runoff process.

TABLE 3

GROUND WATER QUALITY[a]

PARAMETER	OLD SHORE ROAD (Boring B-26) AVERAGE	OLD SHORE ROAD (Boring B-26) RANGE	RAPSON ROAD (Boring B-28) AVERAGE	RAPSON ROAD (Boring B-28) RANGE
pH (25°C)	10.1[b]	9.5 - 10.8	7.9	7.7 - 8.5
Alkalinity	122	86 - 152	218	80 - 298
Hardness	134	79 - 205	159	132 - 180
TDS	402	361 - 463	676	607 - 751
Conductivity (μmhos)	628	560 - 700	1,052	850 - 1,200
Nitrogen, Nitrate	0.24	<0.05 - 0.44	0.05	<0.05 - 0.05
Nitrogen, Ammonia	4.18	3.56 - 4.8	1.17	0.71 - 1.63
Phosphorus	0.02	<0.01 - 0.03	0.04	0.03 - 0.05
Chloride	58	24 - 76	168	64 - 224
Fluoride	1.05	0.75 - 1.35	1.26	1.02 - 1.50
Sulfate	140	118 - 161	95	30 - 182
BOD_5	6	4 - 8	10	4 - 15
COD	172	113 - 230	154	149 - 158

[a]All concentrations in mg/l except pH and conductivity.

[b]Geometric mean used to calculate average pH.

NOTE: Boring locations shown on page A4-2.

TABLE 3 (Continued)

PARAMETER	OLD SHORE ROAD (Boring B-26) AVERAGE	OLD SHORE ROAD (Boring B-26) RANGE	RAPSON ROAD (Boring B-28) AVERAGE	RAPSON ROAD (Boring B-28) RANGE
Phenol	0.007	0.006 - 0.008	0.001	0.001
Calcium	42.9	25.6 - 70.7	40.4	30.3 - 59.8
Sodium	106	91.2 - 132	171	148 - 193
Magnesium	6.5	3.65 - 9.0	14.2	3.2 - 19.7
Potassium	13.6	9.0 - 18.5	22.6	9.12 - 47.5
Iron	7.48	0.76 - 14.2	1.50	0.90 - 2.1
Barium	0.07	0.07	0.06	0.04 - 0.07
Boron	0.11	0.05 - 0.17	0.18	0.08 - 0.29
Silica	14	11 - 17	18	11 - 25
Sulfide	<0.01	<0.01	<0.01	<0.01
Zinc	0.074	0.058 - 0.089	0.064	0.029 - 0.100
Cadmium	0.006	0.005 - 0.008	0.008	0.002 - 0.015
Arsenic	0.012	0.009 - 0.014	0.012	0.003 - 0.020
Copper	0.408	0.036 - 0.779	0.031	0.015 - 0.047
Lead	0.09	0.06 - 0.12	0.12	0.10 - 0.13
Mercury	0.0002	0.0001 - 0.0003	0.00015	0.0001 - 0.0002

TABLE 3 (Continued)

PARAMETER	OLD SHORE ROAD (Boring B-26) AVERAGE	OLD SHORE ROAD (Boring B-26) RANGE	RAPSON ROAD (Boring B-28) AVERAGE	RAPSON ROAD (Boring B-28) RANGE
Selenium	<0.001	<0.001	<0.001	<0.001
Antimony	0.09	0.07 - 0.11	0.04	<0.01 - 0.07
Chromium	0.022	0.018 - 0.025	0.002	<0.001 - 0.004
Lithium	0.184	0.088 - 0.280	0.075	0.058 - 0.092
Manganese	0.268	0.214 - 0.323	0.108	0.029 - 0.188
Molybdenum	<0.01	<0.01	<0.01	<0.01
Nickel	0.02	<0.01 - 0.04	0.015	0.01 - 0.02
Titanium	0.15	<0.1 - 0.2	<0.1	<0.1
Vanadium	<0.1	<0.1	<0.1	<0.1
Zirconium	<1	<1	<1	<1

3.18 One of these intermittent streams (refer to Stream C in Figure 7, page 47) at the northern boundary of the disposal site would accept discharge from the weir. This stream flows under U.S. Highway 25 and meanders through a small farm lot and cattle grazing area to Old Shore Drive. The stream then flows through a wooded area from Old Shore Drive to Lake Huron.

C. Water Quality

3.19 The Federal Water Pollution Control Commission sampled Harbor Beach water quality in 1965. Their results indicated fairly good water quality in the harbor with only soluble phosphates exceeding current acceptable concentration levels. An offshore water sample was taken within the harbor area in 1978, and the analysis of this sample is included with the sediment data in the appendix of this Draft Environmental Impact Statement (page A2-10). The quality of this sample is considered to be good.

D. Water Intake

3.20 The City of Harbor Beach supplies its residents with filtered and chlorinated water from Lake Huron. The water treatment plant is located approximately 1 mile north of the State Street-Huron Street intersection with the intake pipe extending .5 miles offshore and the intake point being approximately 1,500 feet north of the north breakwater. The location of the water intake in relation to the proposed weir discharge area is shown in Figure 2, page x.

E. Wastewater

3.21 Harbor Beach operates a storm water collection system. Discharge is by means of several natural as well as man-made ditches that carry the effluent into the harbor at points north and south of the City. There is no connection between the storm water collection system and the City's sanitary sewer system.

3.22 Currently, the City of Harbor Beach has a secondary sewage treatment system that has been filtering, chlorinating, and digesting wastewater since 1957. Effluent is discharged into Lake Huron at a point 1,500 feet south of the harbor. The sewage treatment plant handles an average of 451,000 gallons per day of residential wastewater and the discharge of one industry, Searle Laboratories, which manufactures pharmaceutical products. Expansion of the present sewage treatment facilities is planned in order to comply with all National Pollutant Discharge Elimination System effluent requirements.

F. Harbor Sediment Quality

3.23 Analyses of sediments from Harbor Beach Harbor were performed by the Environmental Protection Agency (EPA) in 1967, 1968, 1969, 1972, and 1974. Based upon the 1974 survey results, EPA classified the sediments in the harbor as unsuitable for open water disposal. The sediments were mainly silt, clay, and mud ranging in color from brown to dark gray. At one or more of the harbor stations, sediments contained amounts of the following substances in excess of EPA's suggested criteria (guidelines) for unconfined disposal: total volatile solids (TVS), chemical oxygen demand (COD), total Kjeldahl nitrogen (TKN), oil and grease, and zinc.

3.24 The Corps of Engineers had the harbor sediments within the Federal harbor boundary retested on 12 March 1978. Substances found to be in excess of EPA's suggested criteria for unrestricted open water disposal in addition to those detected in earlier tests included: ammonia-nitrogen, phosphorus, arsenic, copper, iron, manganese, and nickel. None of the sediments were found to contain toxic concentrations of substances. According to EPA criteria, the overall character of the sediments is considered to fall within the "moderately polluted" range. Sediments within the Detroit Edison dredging area are assumed to be similar in composition since the area is adjacent to the Federal channel and harbor boundary. Refer to the appendix (page A2-1) for sediment data. Additional sampling and testing are currently planned to analyze the harbor

sediments for phenols, cadmium, and possibly other substances not previously analyzed.

3.25 Some of the contaminating substances in the sediments of Harbor Beach are likely derived from agricultural runoff in the area. Zinc, phosphorus, and nitrogen are commonly applied to agricultural lands to improve crop yields. Storm water runoff from streets and paved areas as well as pollution from boat traffic also have an effect on the sediment quality. The degree to which past effluent discharges from the Hercules Powder Company may have affected present sediment quality is not known. This company was formerly engaged in the production of starch and gluten from wheat.

G. Currents

3.26 Currents in the Harbor Beach area are related to wind and wave actions. Sounding records of the harbor (August 1976) profile the shoaling as being the heaviest in the northeast corner. This shoaling pattern is explained by the fact that the prevailing water currents are from the northward and eastward directions. The composition of the shoaling sediments (clay, mud, and fine sands) indicates that the harbor provides for an excellent settling basin for fine suspended sediments. The lack of larger grain sized sediments also suggests that what currents do exist in the harbor and adjacent waters are not especially strong.

H. Aquatic Fauna

3.27 The Harbor Beach area nearshore benthic community is marked by the dominance of a few species typical of those found in lakes of satisfactory water quality. The composition of this community includes large numbers of crayfish, snails, and bivalved mollusks. In June 1958, and again in August 1965, biological investigations were conducted by the Michigan Water Resources Commission. The result of the survey taken near the wastewater discharge of the Hercules Powder Company demonstrated that the

benthic community is typical of an organically over-enriched environment. It was determined by the data that the quality of the entire harbor had decreased between 1958 and 1965. In 1965, nuisance growths of aquatic weeds and filamentous algae were noted, and growths of slime bacteria were observed east of the Hercules discharge. The harbor was dredged in 1967, and some of this bottom material was likely removed at that time.

3.28 The large central basin of Lake Huron, which includes the Harbor Beach area, traditionally had been the habitat of chubs and lake trout. The invasion of sea lamprey in the 1930's, with the additional pressure of commercial fishing, rapidly decimated the lake trout population. In 1966 the population collapsed. The sea lamprey population in Lake Huron is now under control and the re-establishment of high-value predator species is again taking place. Many of the species present today were deliberately introduced as a result of fishery management. From 1972 to 1975, approximately 65,000 brown trout and over 5,000 steelhead were placed in the Harbor Beach vicinity by the Michigan Department of Natural Resources (MDNR). Rainbow trout plantings for the period between 1971 and 1974 totalled 150,000. Brown and rainbow trout were again planted in 1976 in quantities totalling 20,000 and 30,000, respectively. In 1977, 10,000 rainbow trout and 10,000 brown trout were planted in the Harbor Beach area; in 1978, 50,000 chinook salmon were planted; and in 1979, 75,000 lake trout and 150,000 chinook salmon were planted. Splake and perch are also commonly found in the area.

I. Endangered and Threatened Species

3.29 The peregrine falcon (Falco peregrinus), the eastern timber wolf (Canus lupus lycaon), and the longjaw cisco (Coregonus alpenae) are species on the official U.S. List of Endangered and Threatened Wildlife and Plants, 14 July 1977 Federal Register, that are reported to have ranges in the project area. The peregrine falcon is considered an occasional migrant, and the only known timber wolves in Michigan are located on Isle Royale in Lake Superior. Though the longjaw cisco formerly was found in Lakes

Michigan, Huron, and Erie, it was last reported from Lake Erie in 1961 and is considered extinct in Lakes Michigan and Huron. In addition to the above listed species, the list of endangered species as listed in Michigan's Endangered and Threatened Species Program includes the deep water cisco (Coregonus johannae), blackfin cisco (Coregonus nigripinnis), and the shortnose cisco (Coregonus reighardi). All but the shortnose cisco are considered extinct in Lake Huron. The shortnose cisco primarily inhabits deep water (greater than 200 feet) and should not be affected by the project. No additional threatened or endangered species are expected to be affected.

3.30 No known endangered or threatened plant species are expected to be impacted by the proposed plan. There have been no species of endangered or threatened plants identified at the proposed disposal site or along the pipeline route. Lists that have been consulted include: the Department of Interior, U.S. Fish and Wildlife Service publication entitled "Republication of Lists of Endangered and Threatened Species and Correction of Technical Errors in Final Rules, 50 CFR 17, 20 May 1980" the Michigan Department of Natural Resources' list of endangered and threatened species filed with the Secretary of State on 22 January 1980, and "Michigan's Endangered and Threatened Species Program" (reprinted from the Michigan Botanist, Vol. 16, 1977). A complete list of the vegetation identified on the proposed disposal site is provided in the appendix.

J. Cultural Elements

3.31 Archaeological/Historical. The National Register of Historic Places, 6 February 1979, and subsequent updates list seven sites that occur in Huron County. The Frank Murphy birthplace is one such site, being located at 142 S. Huron Street in Harbor Beach. This site would not be impacted by the proposed project since the site is not along the pipeline route. No districts, sites, or cultural features of historical significance have been recorded in the project area.

3.32 Population/Economy. The population of the City of Harbor Beach was 2,282 in 1960 and 2,134 in 1970 for a decrease of 6.5 percent. During this 10-year period, Huron County remained virtually the same, showing a 0.2 percent population increase from 34,006 to 34,083. In Huron County, the population has been projected to decline to 31,765 by 1980 and to 29,110 by 1990.

3.33 Boating and fishing are the major recreational activities in the harbor area. Boat registrations for the entire State of Michigan in 1974 was over 534,000 for pleasure craft with about 2,020 from Huron County. Harbor Beach is used intensively for recreational boating and fishing during the summer season. There is a marina, public boat launching, fishing facilities, and private and public dock in the vicinity.

3.34 Hunting is also a popular activity in Huron County with pheasant, duck and goose hunters being attracted to the area. At one time, pheasants were more abundant but clean farming practices have caused a decline in habitat quality, resulting in reduced ringneck populations.

3.35 The total area of Huron County as listed in the "Soil Survey of Huron County, Michigan" is 526,080 acres. Approximately 91 percent, or 470,000 acres, is used as farmland. The high productivity of many soils, the climatic conditions, and the economic conditions indicate that the future economy of Huron County will continue to be based largely on agricultural products. Information furnished by the Huron County Agricultural Extension Service has indicated that 318,900 acres of land were used for growing crops in 1979 as compared with 302,800 acres the previous year. Total land devoted to crops has not changed greatly because farm woodlots have been converted to cropland, thereby offsetting the loss to other developments.

3.36 According to the 1974 Michigan Recreation Plan, there are 4,182 acres of public recreation land in Huron County, including 1,172 acres for state parks, 2,340 for state game areas, and 144 acres for water access sites.

3.37 Commerce at Harbor Beach almost entirely consists of the shipping of coal and lignite. This information as published in the Waterborne Commerce of the United States, Part 3, Waterways and Harbors, Great Lakes, is as follows:

TABLE 4

Waterborne Commerce for Harbor Beach Harbor - Combined Tonnage for Coal and Lignite

Year	Tons	Year	Tons
1965	39,680	1972	233,859
1966	41,420	1973	201,260
1967	81,096	1974	237,402
1968	255,728	1975	283,011
1969	237,167	1976	296,511
1970	316,273	1977	268,318
1971	124,380	1978	253,711

The average annual tonnage for the last five-year period (1974 to 1978) is 267,791 tons. This is an increase from an average annual tonnage of 222,588 for the five-year period from 1969 to 1973. With the resumption of maintenance dredging operations, a total tonnage projection for the next ten years has been estimated to be 2,900,000 tons of commerce.

3.38 Existing Land Use. Land west of the proposed disposal site is in agricultural usage. East of U.S. Highway 25, the area is primarily low density residential and wooded. The city limits of Harbor Beach are located approximately 2 miles south of the disposal site. The abandoned railroad right of way near the eastern site boundary is utilized by a local science teacher for field trips. There are no buildings in the proposed disposal area, but the concrete foundations of two buildings occur atop the bluff near the southwest corner of the site.

3.39 Man-Made Facilities and Activities. The major highway transportation routes that serve Harbor Beach are Michigan Highway 142 and U.S. Highway 25. U.S. Highway 25 traverses north and south and connects to Port Huron approximately 60 miles to the south. About 60 additional miles to the south is the Detroit Metropolitan Area.

3.40 Utilities in the Harbor Beach area include water, gas, electricity, and telephone services. City water services extend north of the City to Rapson Road.

4. ENVIRONMENTAL CONSEQUENCES

4.01 This section of the Draft Environmental Impact Statement examines both adverse and beneficial consequences of the proposed project. The environmental effects of project alternatives are discussed in comparative form in Table 5.

A. Dredging Impacts

4.02 Effects on Water Quality. Dredging operations would cause temporary increases in turbidity (water cloudiness) in the dredging area. The installation of necessary pumpout facilities, such as mooring piles or platforms, could also cause turbidity. Suspended material would reduce light penetration and result in a subsequent decrease in productivity of organisms dependent on this type of energy. The impact of turbidity is considered minor because the turbidity would be a temporary, localized condition.

4.03 Effects on Benthos. Any rooted aquatic vegetation or sessile benthic organisms that have colonized in the dredge area since the last maintenance dredging operation in 1967 would be removed by the proposed work. Changes in the benthic populations of the harbor would result in the loss of potential food organisms for resident fish populations.

TABLE 5

Comparison of Environmental Consequences for Alternatives

ALTERNATIVES:	A	B	C	D	E	F
Evaluation Factors:	No-Action	Open Water Disposal for the Creation of Artificial Habitats	Other Open Water Disposal	Upland Disposal on Agricultural Lands	Other Upland Disposal	Low Lying/Wetland Disposal (The Proposed Action)
I. National Economic Development						
1. Property Values	Property value may decrease due to limited access to harbor area.	Property values of areas adjacent to artificial habitat may increase.	No Effect	Property values of treated agricultural land may increase.	Property values of areas adjacent to the disposal site may decrease.	Same as Alternative E
2. Tax Revenue/Public Services and Facilities	Increased transportation costs would increase consumer's costs.	Continuity of safe and economical delivery of coal.	Same as Alternative B	Same as Alternative B	Same as Alternative B	Same as Alternative B
3. Employment/ Labor Force	No effect	May provide increased employment opportunities.	Same as Alternative B	Same as Alternative B	Same as Alternative B	Same as Alternative B
4. Business/Industrial Activity	No effect	Increased recreational useage of the area could stimulate local businesses. Selected contractors would benefit economically.	Selected contractors would benefit economically.	Same as Alternative C	Same as Alternative C	Same as Alternative C
5. Displacement of farms	No effect	No effect	No effect	Temporary encumberance, possibility for enhancement.	Depends on site selected. Could cover more farmland than Alternative F	Borrow pits occupy 22 acres of farmland
6. Construction Costs	None	More expensive than F	Non-treatment of materials prior to disposal -- least costly alternative. Treatment of material prior to disposal-More expensive than F.	More expensive than F	More expensive than F	Least expensive of alternatives B, D, and E
7. Desirable Community Growth/ Community Cohesion	Adverse effect	Could enhance tourism. Beneficial effect of being able to dredge harbor.	Beneficial effect of being able to dredge harbor.	Could enhance agricultural economy.	Same as Alternative C	Same as Alternative C

TABLE 5 (Continued)

Comparison of Environmental Consequences for Alternatives

ALTERNATIVES: / Evaluation Factors:	A No-Action	B Open Water Disposal for the Creation of Artificial Habitats	C Other Open Water Disposal	D Upland Disposal on Agricultural Lands	E Other Upland Disposal	F Low Lying/Wetland Disposal (The Proposed Action)
II. Environmental Quality						
1. Man-made Resources	No effect	Create new recreational area	No effect	No effect	No effect	No effect
2. Natural Resources	Continued shoaling of harbor area	Create new habitat for fish & wildlife	Elimination of aquatic bottomland in disposal area	Agricultural improvement	Displacement/ Elimination of terrestrial biota	Alteration of wetland and subsequent loss of wildlife habitat
3. Air Pollution	No effect	Minor temporary increases in ambient levels caused by construction and operational activities	Same as Alternative B	Same as Alternative B	Same as Alternative B	Same as Alternative B
4. Noise Pollution	No effect	Minor temporary increases in ambient noise levels due to construction and operational activities	Same as Alternative B	Same as Alternative B	Same as Alternative B	Same as Alternative B
5. Water Pollution	Continued accumulation of contaminated sediments	Temporary reduction in water quality due to suspension of bottom sediments	Same as Alternative B	No effect	No effect	Same as Alternative B
III. Social Well-Being						
1. Aesthetic Values	No significant effects	Attraction of additional fish and wildlife to area.	Temporary turbidity may be visually displeasing.	Possible odor problems from contaminated spoils.	Cutting of natural vegetation. Possible odor problems from contaminated spoils.	Same as Alternative E
2. Public Safety	No significant effects	Possible hazard to navigation.	Same as Alternative A	Increased truck traffic could be hazardous.	Same as Alternative D	Same as Alternative D
3. Recreational Opportunities	More frequent fuel deliveries may affect recreational boating.	May provide greater recreational opportunities in the area.	May disrupt boating activities	No effect	Same as Alternative D	Same as Alternative D

However, unaffected adjacent littoral zones and nearby Lake Huron would provide substantial and sufficient food organisms. Prior maintenance dredging at Harbor Beach has produced no noticeable effects on resident fish species. Some fishermen have observed that their fishing improves when following behind the dredge during the dredging operations. This is due to the initial release of infaunal food supplies caused by the action of dredging.

4.04 Effects on Macro-Organisms. The resuspension of bottom sediments, mainly in the form of finer, slower settling silts and clays, cannot be considered beneficial to aquatic organisms, particularly fish. As discussed previously, resuspension of bottom sediments normally leads to a reduction in the dissolved oxygen concentration of the affected waters. Resuspended benthic material, if present in sufficient quantity, can result in damages to the respiratory organs; e.g., gill fibers and filaments of fish. However, this effect is anticipated to be minimal due to avoidance behavior to these conditions exhibited by fish. Fish instinctively move away from highly turbid or low dissolved oxygen areas. The sphere of influence of these impacts are greatest in a localized area immediately around the dredge. As the distance increases from the dredge, the severity of these impacts taper off. A beneficial effect of the resuspension of benthic material is that there is a temporary abundance of food made available to the local fish population. The proposed dredging would be carried out only during times approved by the Michigan Department of Natural Resources in order to have the least impact on fishery resources of the harbor area.

B. Disposal Impacts

4.05 At the scoping meeting held on 16 July 1980 to identify significant issues for assessment in the Draft Environmental Impact Statement, it was determined that the emphasis of the Statement should be on the effects resulting from the dredged material disposal operations (see paragraph 5.03 for a list of participants at the meeting). Many issues were identified in regard to the planned placement of dredged material at the

proposed site. Principle issues concerned possible impacts on the municipal water intake, ground water supplies, flooding, and wildlife habitat.

4.06 Effects on Municipal Water Intake. The dredged material would be deposited as a slurry at the confined disposal site. Sediments would settle out as the slurry is contained, and excess water would drain toward the northwest corner of the disposal facility. After the contained water reaches a set level, excess water would be released through a weir into an existing natural drainage channel which carries an intermittent stream. This channel flows to Lake Huron and outlets approximately 1.3 miles north of the City of Harbor Beach's municipal water intake.

4.07 The primary direction of littoral drift in the Harbor Beach area is north to south. The width of the wetted beach to the 6 foot depth contour in the reach from the weir discharge outlet at Lake Huron to the City water intake is 1/2 to 1 mile. It is noted that the actual intake is beyond the 6 foot depth contour or the zone of significant littoral drift. To reach the vicinity of the intake, the weir discharge must flow about 1/2 mile downstream to the lake, and more than a mile alongshore to the intake pipe. Longshore transport is never directly in a line offshore. Considering the time, distance, and increased water depth that a potential contaminant would have to follow, a great deal of dispersion and settling would occur to assure the purity of the City water supply. Detroit Edison's Research Department Environmental Group would implement a program to monitor water quality during excess water discharge operations. The proposed confined disposal facility would be designed so that discharges would have an acceptable level of not more than 30 milligrams per liter of suspended solids. Considering all of these factors, the Corps has concluded that it is unlikely that the proposed action would affect the Harbor Beach municipal water supply.

4.08 Detroit Edison has undertaken a supernatant chemistry analysis utilizing samples of the dredged material, and the Corps has had elutriate

tests conducted on sediment samples taken in the harbor. Based on the results of the analysis and tests, it is reasonable to assume that quality of the weir discharge can be adequately controlled to prevent any significant adverse effects on the water quality of Lake Huron. If the effluent discharge is detected to be unacceptable during the monitoring procedures, corrective measures would be taken. For example, corrective measures could include the chemical treatment of the material to make the sediments settle out faster or controlling the rate at which sediment is placed in the confined disposal facility. Disposal operations can be stopped altogether if warranted by the monitoring program.

4.09 Effects on Ground Water Supplies. The subsurface soil condition within and adjacent to the proposed disposal facility consists of a top layer of pervious sand underlain by practically impervious glacial deposits (till) consisting of silty clays and clayey silts. Both infiltration and ground water movement rates are low.

4.10 Dikes for the proposed confined disposal facility would be constructed with key trenches cut through the surficial sand deposits to the underlying till and backfilled with till from the adjacent upland area. This key trench will effectively cut off the interconnection of the surface sands beneath the disposal area with those on the outside of the disposal area. The dikes would also be constructed of relatively impervious till. Furthermore, the dredged material, which will be placed within the diked area, is fine-grained and will effectively seal the surficial sand layer and prevent infiltration into this layer.

4.11 Impacts of the proposed disposal facility on ground water resources are anticipated to be minimal. The disposal area would be sealed off from surrounding ground water in the surficial sands by the proposed cut off trench, and the practically impervious till layer would prevent any significant downward leaching to ground water in the bedrock. Since it is essentially impervious, the till layer is not considered to be a ground water aquifer. Randomly distributed sand and gravel deposits within the

till are discontinuous and are separated from the ground surface by a layer of till. Ground water which may be present in the upper portions of the bedrock (Coldwater Formation) would be separated from the bottom of the proposed facility by an excess of 25 feet of till.

4.12 The weir discharge would have an opportunity to enter ground water in the surficial sands via the approximately 2,000 foot long channel route to the outlet at Lake Huron. A supernatant chemistry analysis from tests on sediment, performed by Dames and Moore, Inc. using tap water revealed that many substances in the supernatant were at amounts less than those measured in the existing ground water (see Table 6). The supernatant consisted of water mixed with sediment samples and allowed to settle. The exception in this analysis was nitrogen-ammonia, which was measured in the supernatant to range from 16 to 24 mg/l as compared with 3.5 to 4.8 mg/l in the existing ground water. This result represents an uncertain potential for elevating nitrogen-ammonia in ground water that may be affected by the weir discharge. Should any such ground water be used for drinking water supply, the practice of chlorination may produce chloramines. These compounds (if in sufficient quantities) could result in taste and odor problems. However, the proposed monitoring program would be designed to detect any water quality problems at the weir discharge. At several Corps' confined disposal facilities, wells have been installed to monitor effects of projects on ground water. If necessary, a well monitoring program could be adopted for the proposed confined disposal facility at Harbor Beach.

4.13 Recharge to the surficial sand aquifer is by direct infiltration from rainfall. The recharge area that is bounded by the bluff, Minnick Road, the railroad berm, and Rapson Road includes approximately 120 acres. Construction of the confined disposal facility would reduce this recharge area by 65 acres, since the dike for the proposed facility would be constructed with key trenches to cut off the ground water connection to the surficial sands. Further investigation will be required to evaluate any possible effects on shallow wells located east of the proposed facility.

TABLE 6

SUPERNATANT CHEMISTRY ANALYSIS

Dredge Disposal Facility
Harbor Beach, Michigan

Analysis	Units	Sediment Sample No. 1 255-47-1	Sediment Sample No. 3 255-47-2
Arsenic	mg/l	<0.003	>0.003
Chromium	mg/l	<0.02	<0.02
Copper	mg/l	0.02	0.02
Iron	mg/l	0.53	1.0
Lead	mg/l	<0.03	<0.03
Manganese	mg/l	0.10	0.11
Mercury	µg/l	<0.001	<0.001
Nickel	mg/l	<0.03	<0.03
Zinc	mg/l	0.04	0.03
Chemical Oxygen Demand	mg/l	<20	<20
Nitrogen, Ammonia	mg N/l	24	16
*Nitrogen, Total Kjeldahl	mg N/l	22	22
Oil and Grease	mg/l	<5.0	<5.0
pH		7.4	7.5
*Phosphate - Total	mg P/l	0.041	0.046
*Residue - Total	mg/l	250	290
*Residue - Volatile Total	mg/l	62	56

NOTE: Sediment samples taken east of the Harbor Beach Power Plant in the harbor area near the Federal Project boundary line.

Table 3, page 28 lists existing ground water conditions. Asterisked substances were not analyzed for in the ground water samples taken. Of the substances analyzed both in the supernatant and ground water, only Nitrogen, ammonia appeared to be at a higher concentration in the supernatant than in the ground water (using average concentrations for ground water).

Ground water recharge in the underlying till or bedrock should not be significantly affected. There are no known continuous sand and gravel deposits within the till. Recharge to those deposits which are present is through the extremely slow seepage of rainfall through the surrounding till. Since the sand and gravel deposits within the till are randomly distributed and discontinuous, the dredged material disposal facility would have no effect upon recharge to those deposits which are located outside of the facility. The upper portion of the bedrock cannot technically be considered as an aquifer unit. Water which is present within joints and fractures is recharged through the slow infiltration from the overlying materials. This infiltration would continue in all areas outside of the facility.

4.14 Effects on Flooding. The following paragraphs utilize studies of the site conducted by Dames and Moore, Inc. and Harding-Lawson Associates for Detroit Edison. At a meeting held to discuss the preparation of the Draft Environmental Impact Statement, a neighboring property owner north of the proposed disposal site expressed concern that his property, including a pond which he utilizes for his domestic water supply, would be directly impacted by flooding. This private property is situated in areas identified as Basin A and Basin B in the hydrologic studies (see Figure 7). Stream C, as indicated in Figure 7, would be diverted around the northern dike of the proposed dredged material disposal facility. The flow of stream C would be directed onto land north of an unimproved road which traverses the site. According to the neighboring property owner, who is a long time resident of the area, water from stream C has never before crossed over this unimproved road onto his land. He has stated that parts of his property currently flood naturally from the overflow of stream B and that on occasions water has been near the top elevation of his residential driveway. It is his concern that more of his land would be inundated when water from stream C is diverted into the basin of stream B. Harding-Lawson Associates has computed that after construction of the dredged material disposal facility, the area between this neighboring property owner's residential driveway and the northern dike of the facility

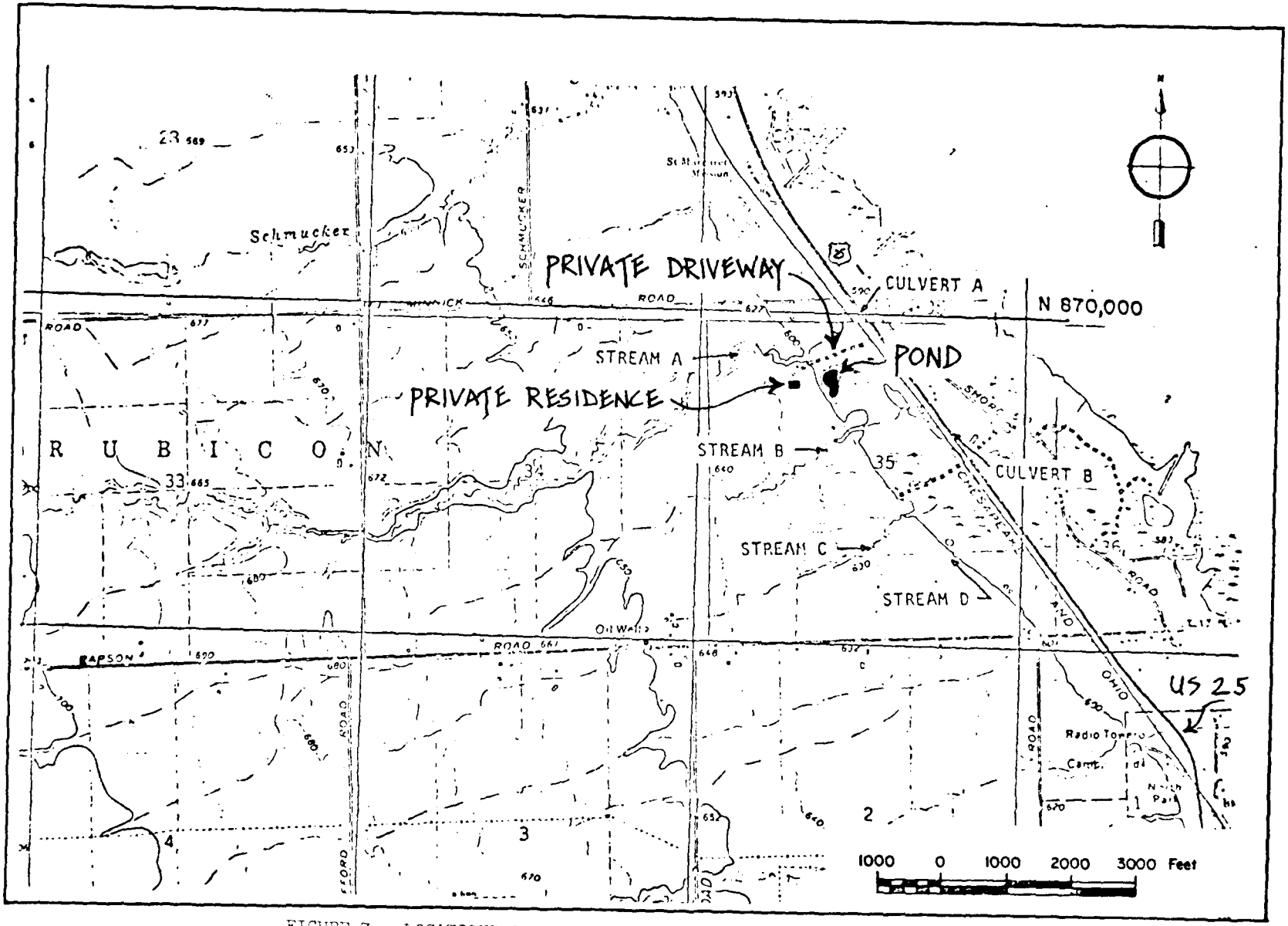


FIGURE 7 - LOCATIONS OF STREAMS NEAR THE PROPOSED DISPOSAL SITE

would experience an increase in flood elevation of 14.4 inches above the flood elevation prior to construction for a 50 year frequency storm 24 hour event (592.6 feet to 593.8 feet, Mean Sea Level-MSL). For a 100 year frequency storm, 24 hour event, there would be an increase in flood elevation of 16.8 inches (592.8 to 594.2 feet MSL). The area between Minnick Road and the residential driveway has an elevation averaging 594 feet MSL, while the private property south of the residential driveway varies in elevation from approximately 590.5 feet to 599.5 feet MSL, with the higher elevation being located in the southwest corner of the property. Additional study will be required to evaluate the effects of a rise in flood elevation on this northern-neighboring property. If these effects are found to be significant, it may be possible to mitigate some effects by including structural measures (such as an additional berm, channel construction techniques, or control gates, for example) in the proposed plan. Such measures could be considered as conditions of a granted Corps permit. The neighboring property owner's house would not be directly impacted as it is located on top of the bluff (elevation approximately 620 feet MSL), however his pasture land, woodlot, driveway, and pond are situated in the area that may be affected by a rise in flood elevation. All other residents near the proposed site are located east of U.S. Highway 25. The highway, at an elevation of 595 feet MSL, would provide a protective barrier from flooding for these residents.

4.15 Four natural drainages in the area might be affected by the proposed action. The Dames & Moore hydrologic study, considered the hydrology of these four basins before and after the construction of the disposal facility. Dames & Moore labeled the basins A, B, C, D, from north to south, respectively (Figure 7). Using Soil Conservation Service techniques, Dames & Moore estimated 1, 10, 25, 50, and 100 year, 24-hour storm events, excluding the effects of snowmelt. "Storm events" is conventional terminology that is often used to discuss water volumes and to predict flooding. The terminology refers to the number of years estimated before a storm of a certain intensity and duration is likely to occur. A 100 year frequency storm event is considered to be an intense storm of extended

duration that would occur once in 100 years. Normally the 50, 25, 10, and 1 year frequency storm events are in descending order of intensity and duration. Using storm events calculations and channel and culvert capacities as determined by field observations, Dames & Moore concluded:

(1) Basin A could accommodate all predicted events.

(2) Basin B flooded in the 50 and 100 year storm events under "wet moisture" (low infiltration) conditions. Data for basins B, C, and D were combined to find flooding conditions prior to construction.

(3) Data for B and C were combined to find flooding conditions following construction, since flow from C would be diverted into B due to the facility. The overall limiting factor is the culvert capacity of B, which is 160 cubic feet per second (cfs). The flood area is west of U.S. Highway 25, which forms a barrier of 595 feet MSL. Only 160 cfs can flow through the culvert under U.S. Highway 25; therefore, for water to back up upstream from U.S. Highway 25 at the present time, a discharge of 1,450 cfs, a larger than 500 year, 24 hour storm event, is needed. To flood U.S. Highway 25 in a post construction situation, a discharge of 844 cfs, a 380 year, 24 hour event, would be needed. Basins B and C flood naturally (50 and 100 year events) but flooding will be slightly greater because excess flow would be dispersed over a smaller area due to the disposal facility. The area reduction is 65 acres, from 120 acres to 55 acres. The basin B culvert capacity would be exceeded for the 10, 25, 50, and 100 year 24-hour events under wet moisture conditions. For the 50 year design event, the elevation of the flood in channel B prior to construction is estimated at 592.6 feet; following construction the flood elevation is estimated at 593.8 feet. This difference is insignificant because the flood water flows onward via sheet runoff and in lesser defined channels in addition to the main channel. Flood passage times were also estimated by Dames & Moore and the differences in pre- and post-construction times were found to be insignificant, less than 1 percent in all cases.

4.16 Except for neighboring private property located north of the proposed facility (refer to paragraph 4.14), the data from the Dames and Moore study indicates that flooding impacts would be insignificant because:

(1) The 50 year 24 hour storm event will peak only 1.2 feet higher with the proposed action than in the present condition.

(2) Flooding occurs only on the west side of U.S. Highway 25, due to the limiting capacity of the culvert and the barrier which the highway forms. In order for the east side of the highway to flood with the proposed action, it must be overtopped with a 380 year, 24 hour event of 844 cfs.

(3) All residences and private structures located east of U.S. Highway 25 are at least 500 feet from the proposed discharge channel, according to a 1976 air photo.

(4) The decrease in flood passage time with the proposed structure is less than 1 percent for all events considered in the Dames and Moore study.

4.17 Between U.S. Highway 25 and Old Shore Drive, the natural drainage channel that would accept the weir discharge meanders through a farm lot owned by Detroit Edison. A change in the duration of water flow in this length of channel could accelerate the process of erosion. This effect would likely be less severe along the length of channel from Old Shore Drive to Lake Huron due to the cobble-covered condition of the channel bed. Changing the course of this drainage channel at the northwest end of the proposed disposal site would affect drainage patterns of the area, as discussed in paragraph 4.14. This channel is incised near the bluff but becomes less recognizable as it flows toward U.S. Highway 25. Trees along the drainage channel within the proposed facility would be cut in the same manner as other trees within the facility. Dredged material eventually will be placed within the former channel bed.

4.18 Effects on Wildlife Habitat-Wetlands. The proposed confined disposal facility would cause changes to the existing wetland character of the site. Approximately 33.3 acres of seasonally flooded, forested land, consisting primarily of green ash (Fraxinus pennsylvanica), would be clear cut in the proposed dredged material disposal area. After perimeter dikes were constructed and disposal operations begun, a permanent pond of water would be formed. The pond is expected to be 55 acres in size. Wetland vegetation in other areas of the site (approximately 17 acres of shrub swamp and 7.5 acres of cattail marsh) would be covered with disposed material and possibly inundated with water. It is anticipated that wetland vegetation would re-establish around the fringes of the proposed pond. Depending upon the water level maintained in the pond, wetland vegetation could also become established in the disposal pond itself. The nutrient content of the dredged material would accelerate plant growth.

4.19 Following disposal operations, the project site would no longer be only a seasonally flooded area. Rather, it would be a ponded area. The major implication of this action appears to be the loss of approximately 33.3 acres of forested land which provides a habitat for many wildlife species during certain times of the year. Habitat for other species of wildlife which utilize an aquatic environment could be enhanced.

4.20 Representatives of the U.S. Fish and Wildlife Service have stated that the proposed site is used extensively as a deer wintering area. There has been concern expressed by the Service that increased numbers of deer would be killed by cars on U.S. Highway 25 as a result of the proposed project. Approximately 10 acres of forested wetland north of the proposed disposal site would be left in its natural state, and a 50 to 75 foot wide buffer zone of trees would be preserved along the eastern boundary of the site. Some habitat for deer traveling through the Detroit Edison property would, therefore, be maintained. The acreage of land lying between the bluff line and the Lake Huron shoreline from the radio tower near the City of Harbor Beach to Rubicon Road near Port Hope has been estimated to be 1,745 acres. Only 80 acres of this total are situated south of the

proposed confined disposal facility. While the facility itself would remove approximately 65 acres of deer habitat as a result of site alterations and fencing, the location of the facility would not appear to significantly block wildlife movement. Further coordination with State and Federal agencies is planned to evaluate the number of deer that could be impacted by the proposed project.

C. General Impacts

4.21 Use of the proposed disposal area for the confinement of polluted dredging material would serve to remove a source for contamination of local waters and thereby would also reduce risks to the aquatic life in the area from associated adverse impacts. Contained disposal of polluted material on land can be regarded as a form of waste-treatment by removing substantial quantities of organic matter from the lake system. While the release of disease vectors remains a possibility, the nature of the dredged material is such that the potential danger from this source should be minimal. There currently exist several areas of shallow surface water in and around the proposed confined disposal site. However, should there be any unforeseen local problems related to insects, these could be mitigated through treatment with biodegradable insecticides or other methods.

4.22 Social and Economic Resources. Dredging and disposal operations would allow Detroit Edison to continue coal deliveries by waterborne transport to its Harbor Beach Power Plant. Providing dependable electric power obviously has many ramifications on social and economic well-being. The impacts of not being able to maintain navigation depth for the delivery of coal at the Harbor Beach Power Plant would be felt by Detroit Edison's customers in terms of both cost of power and dependability of service. Detroit Edison employs persons in the Harbor Beach area to work at the power plant, and these jobs could be affected by curtailment of Harbor Beach operations.

4.23 Detroit Edison has informed the Corps of Engineers that when the proposed disposal facility is in operation, it would be available free of charge for the disposal of Corps' maintenance dredgings from the Federal navigation channel at Harbor Beach. This would be of great economic benefit to the Federal government since it would not have to seek a means of disposing of dredge material.

4.24 Secondary and Cumulative Effects. The excavation of the borrow area to obtain materials for dike construction would affect approximately 22.5 acres of existing agricultural land. One possible use for the borrow areas could be for fly ash disposal. If used for such a purpose, a phased filling process would take place over the life of the Harbor Beach Power Plant. The site could eventually be graded and reclaimed for re-vegetation. Fly ash placement activities, involving the transport of fly ash and land filling procedures, would be considered as secondary impacts of the proposed project. The fly ash disposal operations would require approval of the Environmental Protection Agency in order to insure that water quality would not be adversely affected. Impacts resulting from filling activities would include dust and noise from trucks delivering ash.

4.25 The loss of productive farmland in the borrow area would reduce the amount of cropland available in Huron County. Although this loss would be small in relation to the total amount of cropland now in the county, there could be a cumulative effect over a period of time when combined with other land use changes to agricultural land.

4.26 A site near Harbor Beach was previously under consideration by Detroit Edison for the location of future generation facilities. Recent studies, now terminated, were necessary at this site in order to provide Detroit Edison needed ambient background data to be used in evaluating the areas' overall suitability for future generation development. Other sites like the site near Harbor Beach were also investigated. At this time, Detroit Edison has no plans to proceed with development of new generation facilities in the Harbor Beach area.

4.27 Aesthetics. Minor adverse aesthetic effects caused by construction and disposal work would be a temporary impact over the life of the project. Most of the noise, dirt, and traffic would be associated with the formation of the dike inclosures. Noise from pumping operations from the dredge should not be significant. The pipeline would not be placed near any residences. Odors associated with the dredged material have been described as earthy and/or musty by the Environmental Protection Agency. Any odors released by the disposal operations should be short-lived as the odors are biologically degradable.

4.28 Alteration of the site including the clearing of forest vegetation and the construction of a perimeter dike would be a major impact to the appearance of the area. However, a buffer zone of vegetation between U.S. Highway 25 and the proposed dike would be maintained to screen the dike from the highway. At the meeting held to discuss the preparation of the Draft Environmental Impact Statement, Detroit Edison presented an artist's drawing of the proposed facility. The proposed 14 foot high dikes were depicted as being grass covered and partially screened by the grove of trees to be left along U.S. Highway 25; however, the proposed dikes would be visible from Rapson Road. No significant adverse effects on the tourism industry for Harbor Beach are anticipated as a result of the proposed project.

4.29 During operation of the facility, there exists a possible danger to children in the vicinity accustomed to exploring the site as a natural area. As a precaution against accidents, the areas where filling operations are taking place would be fenced.

4.30 Recreation. The site for the confined disposal facility is owned by the Detroit Edison Company. Present unauthorized recreational use of the site likely consists of hiking and snowmobiling. A minor lessening effect on hunting opportunities in Huron County could occur as a result of the destruction of forested wildlife habitat.

4.31 If shoaling of the harbor area reaches the stage where recreational boating is impeded and the Corps could not dredge for lack of a dredged material disposal site, recreational interests in the Harbor Beach area would suffer. However, shoaling of such a magnitude is not imminent.

4.32 Endangered and Threatened Species. In 1979, a site survey conducted by Hazleton Environmental Sciences, Inc. indicated that there are no State or Federally listed endangered or threatened plant or wildlife species located at the proposed disposal site, therefore no effects are expected.

4.33 Historical and Archaeological Sites. No site listed on the National Register of Historic Places would be affected by the proposed project. Coordination has been made with the Michigan Historic Preservation Officer, who has concluded that the proposed project would have no effect on any cultural resources either eligible for or listed on the National Register of Historic Places.

4.34 Effects of Proposed Project on Land Use Plans. A zoning variance from Rubicon Township is currently being sought by Detroit Edison for use of the proposed disposal site. Granting of this variance by the Township would mean that the use of the site is consistent with local land use plans. According to the Corp's permit policy and regulations, a Department of Army permit cannot be granted for an activity, if necessary State or local permits and approvals required by law are denied. Even if official certification and/or authorization is not required by State or Federal law, but a State, regional, or local agency having jurisdiction or interest over the particular activity comments on the application, due consideration shall be given to those official views as a reflection of local factors of the public interest. Therefore, if the zoning variance is not secured and the Corps is officially notified, the Federal permit to use the proposed site for dredged material disposal could be denied. The East Central Michigan Planning and Development Commission, represented at the meeting held to discuss preparation of the Environmental Impact Statement, will be given the opportunity to review this Draft

Environmental Impact Statement. Coordination with the State of Michigan will include certification that the project is consistent with the Coastal Zone Management Program.

4.35 Relationship Between Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity. On-land confinement of sediments which are unsuitable for release into open waters contributes to long-term improvements in the trophic condition of Harbor Beach Harbor, Lake Huron, and the Great Lakes in general. Detroit Edison's plans for final disposition of this site have not been formed. At the present time the facility is designed to hold predicted volumes of dredge materials for a ten year period.

4.36 Irreversible and Irretrievable Commitment of Resources Which Would be Involved if the Proposed Action Should be Implemented. Commitments of labor, fuel, and equipment would be required for construction of the disposal facility and for the dredging operations. Once expended, these resources are generally irretrievable.

4.37 The operation of the confined disposal facility for dredged material would encumber 65 acres of primarily forested wetland for a 10 year period. Trees on the site would be cut down, but it is conceivable that at the end of the 10 years the site could be revegetated. Since a pond would be maintained in the disposal area, a wetland habitat would still exist during operation of the confined disposal facility.

4.38 In the same regard, the borrow pit areas could be reclaimed for a productive use. These borrow areas involve 22.5 acres of land currently in use for agriculture.

5. PUBLIC INVOLVEMENT

A. Detroit Edison's Permit Application for a Private Confined Disposal Site

5.01 On 8 May 1980, a Department of Army & MDNR Joint Public Notice (Permit Application Process No. 792253C/79-11-129C) was published describing Detroit Edison's proposed project and indicating the intent by the Corps of Engineers to prepare a Draft Environmental Impact Statement (EIS). A Notice of Intent to prepare an EIS appeared in the Federal Register on 24 June 1980.

5.02 Many adverse comments were received in response to the public notice for the permit application. These comments can be summarized as follows:

a. Water quality degradation resulting from toxic waste infiltration.
b. Hazards involved using borrow pits for fly ash disposal.
c. Disposal site is contrary to Huron County Zoning Ordinances.
d. Possible alternative disposal sites (island in Lake Huron).
e. Possible flood damage.
f. Annual sediment contamination.
g. Loss of valuable wetlands, wildlife habitat, and resources.
h. Loss of farmland.
i. Error in Preliminary Environmental Assessment regarding the relative locations of the public water intake and disposal pond discharge point.

5.03 The U.S. Fish and Wildlife Service responded to the public notice and stated that the Service would object to the proposed project because of the adverse effects on wetlands. The Environmental Protection Agency responded that it would provide comments after reviewing the Draft EIS.

5.04 A scoping meeting was held at Detroit District Headquarters on 16 July 1980. Federal, State, local agencies, and several interested persons and organizations were invited to attend in order to identify and address significant project issues for inclusion in the Environmental Statement. The following individuals were in attendance at the meeting:

Abram Nicholson	Corps of Engineers
Dan Allega	Corps of Engineers
Stanley R. Jacek	Corps of Engineers
James DeMunnik	Corps of Engineers
Jeff Bridge	Corps of Engineers
Pete Cook	Detroit Edison Co.
Ron Nowicki	Detroit Edison Co.
Michael J. Blunden	Detroit Edison Co.
Bill Wickers	Detroit Edison Co.
Steve Spencer	Michigan Department of Natural Resources
Gary Gettel	Michigan Department of Natural Resources
Scot Shalaway	Michigan Department of Natural Resources
Albert Thoms	Huron County Board
Marvin Kociba	Farmer - Harbor Beach, Michigan area
William Klump	City of Harbor Beach
Carl Roggenbuck	Farmer - Port Hope, Michigan
Edwin Schulsing	Rubicon Twp. Supervisor
Susan Parcells	Private Citizen - Grosse Pointe, Michigan
Charles Parcells	Private Citizen - Grosse Pointe, Michigan
Jim Hooper	Environmental Protection Agency
Jim Sygo	East Central Michigan Plng. and Development
Rick Julian	U.S. Fish and Wildlife Service
Wayne Schmidt	Michigan United Conservation Clubs
Howard L. Anderson	Huron Co. Plng. and Zoning Commission
George E. Heim	Harding-Lawson Assoc., Consulting Engineers - Oak Brook, Illinois

5.05 This Draft EIS has been prepared according to the guidelines of Section 102 of the National Environmental Policy Act, and the evaluation of the effects of the discharge of dredged or fill material into waters of the United States has included the application of guidelines for Section 404(b) of the Clean Water Act. The EIS document or a notice of its availability has been circulated to governmental agencies, organized groups, individuals, and libraries. In addition, the availability of the Draft EIS has been transmitted through the issuance of a Public Notice. A 45-day comment period for public and agency review of the Draft EIS begins on the date the U.S. Environmental Protection Agency publishes a notice of the availability of Draft EIS in the Federal Register or on the date of delivery for mailing of copies to agencies, groups and individuals, whichever is later. Comments should be furnished to the District Engineer within this 45 day period.

5.06 Federal, State, and local agencies, civic/conservation organizations, and individuals to whom copies of this Draft EIS have been sent are listed in Section 6 of this document.

B. Corps Efforts to Secure a Confined Disposal Site at Harbor Beach

5.07 The first contact of local government agencies was made in November 1971 with representatives of the City of Harbor Beach, Michigan Department of Natural Resources, and the Michigan Department of Commerce to discuss possible sites for the construction of a confined disposal facility to contain sediments unsuitable for open water disposal dredged from the Federal Navigation Project at Harbor Beach, Michigan. Three disposal site alternatives were discussed. All sites involved construction on bottomland within the confines of the harbor. A second meeting was carried out with local authorities on 8 February 1974 to update the committee.

5.08 On 29 August 1974 a site inspection was made in regard to confined disposal areas at Harbor Beach. The State of Michigan DNR, U.S. Fish and Wildlife Service, City of Harbor Beach, and the Corps of Engineers were

represented. Two sites were considered, one was located partly on the City of Harbor Beach's Waterworks Park, the other just inside of the north end of the main breakwater on State bottomland.

5.09 Another meeting with city officials was held on 14 November 1974. The City of Harbor Beach was represented by the Mayor, a City Councilman, and representatives of EPA, Corps of Engineers, and Detroit Edison. Various configurations for offshore disposal sites were discussed.

5.10 A Public Workshop was held in the City of Harbor Beach on 10 December 1974 to obtain public input on consideration of alternative sites. The Corps of Engineers began by describing the purpose of the workshop and providing background information of the subject proposal. The Corps of Engineers discussed the Environmental Protection Agency responsibility for determining the quality of sediments, Public Law 91-611 calling for disposal of dredged materials which are unsuitable for release into open water, the Governor of Michigan's request, and the site selection process as well as the local responsibilities and the duration of the project. The Corps discussed previous local contacts, presented slides of the candidate sites, explained the need for the project, the kinds of equipment, and costs.

5.11 Contact was again made with the City of Harbor Beach on 16 September 1976 to discuss the possible use of Detroit Edison property located north of the city. At this point in the project development, support was greater for using an upland disposal site in lieu of using Lake Huron's bottomland.

5.12 A second Public Workshop was held in Harbor Beach on 13 December 1976. Three possible sites for the confined disposal site were presented. Site No. 1 was land owned by the City of Harbor Beach and located in the Waterworks Park area. Site No. 2 is property owned by the Hercules Powder Company and is located just south of their plant along the waterfront. Site No. 3, owned by Huron County, is located between Buhl and McIntosh Roads. It was described as an abandoned gravel pit.

5.13 A Draft EIS was prepared and circulated in December of 1977. The proposed plan involved the use of Site No. 3 as a final disposal site and the use of Site No. 1 as an interim site. On 25 July 1978, a meeting was held between Corps personnel and the Huron County Board of Commissioners. The Board voted against use of Site No. 3 and refused to grant necessary local approvals. Reasons for the Board's rejection of the proposed plan were related to concerns about ground water contamination.

6. LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THIS STATEMENT WERE SENT

Mr. George E. Heim
Harding-Lawson Associates
125 Windsor Drive, Suite 107
Oak Brook, IL. 60521

Mr. William Klump
City of Harbor Beach
149 N. First Street
Harbor Beach, MI 48441

Mr. Howard Anderson
Building & Zoning Department
Huron County Building
Bad Axe, MI 48413

Mr. Marvin Kociba
1963 North Lakeshore
Harbor Beach, MI 48441

Mr. Wayne Schmidt
Michigan United Conserv. Clubs
P.O. Box 30235
Lansing, MI 48909

Mr. Albert Thomas
Route 2, Box 21
Harbor Beach, MI 48441

Mr. Rick Julian
Manly Miles Bldg, Room 202
1405 South Harrison Road
East Lansing, MI 48823

Mr. Scot Shalaway
Dept. of Natural Resources
P.O. Box 30028
Lansing, MI 48909

Mr. Jim Sygo
E.C.M.P. & D.C.
500 Federal Ave., P.O. Box 30028
Saginaw, MI 48606

Mr. Gary Gettel
Dept. of Natural Resources
P.O. Box 30028
Lansing, MI 48909

Mr. Jim Hooper
U.S. EPA, Region V
230 South Dearborn Street
Chicago, IL 60604

Mr. Steve Spencer
Dept. of Natural Resources
P.O. Box 30028
Lansing, MI 48909

Mr. Charles Parcells, III
1167 Lakepointe
Grosse Pointe Park, MI 48230

Susan Parcells
1167 Lakepointe
Grosse Pointe Park, MI 48230

Mr. Edwin Schulsing
Rubicon Township Supervisor
Township of Rubicon
Port Hope, MI 48468

Mr. Carl Roggenbuck
8271 Ramsey Road
Port Hope, MI 48468

Mr. Marvin L. Goretski, Supervisor
Port Austin Township
8190 Hellems
Port Austin, Michigan 48467

Mr. Joseph Ruth, Supervisor
Hume Township
Rt. #1
Port Austin, Michigan 48467

Mr. Ted H. Schubel, Supervisor
Pte. Aux Barques Township
Pte. Auz Barques, Michigan 48467

Mr. Robert Lemanski, Supervisor
Dwight Township
Port Austin, Michigan 48467

Mr. William Lackowski, Supervisor
Paris Township
Ruth, Michigan 48470

Mr. Bill Wickers
Detroit Edison Company
2000 Second Avenue, 357 ICT
Detroit, MI 48226

Mr. Michael J. Blunden
Detroit Edison Company
2000 Second Avenue, 357 ICT
Detroit, MI 48226

Mr. Ron Nowicki
Detroit Edison Company
2000 Second Avenue, 357 ICT
Detroit, MI 48226

Mr. Pete Cook
Detroit Edison Company
2000 Second Avenue, 357 ICT
Detroit, MI 48226

Village Clerk
5605 Cedar Avenue
Forestville, Michigan 48434

Ms. Jeanette Learman
46 Westland Drive
Bad Axe, MI 48413

Mr. Harry Gorney, Supervisor
Sigel Township
Rt. #1
Bad Axe, Michigan 48413

Mr. Frank Nichol, Supervisor
Bloomfield Township
Bad Axe, Michigan 48413

Mr. Robert Tufts
Huron County Drain Commissioner
P.O. Box 270, County Courthouse
Bad Ave, MI 48413

Mr. Gene Knight
Knight Gravel Company
Port Sanilac, Michigan 48469

Mr. Harvey Murdock, Supervisor
Colfax Township
N. McMillan Rd., Rt. #1
Bad Axe, Michigan 48413

City Clerk
City of Port Hope
Port Hope, Michigan 48468

Mr. Robert D. Becking
Sheridan Township
Rt. #2
Bad Axe, MI 48413

Mr. Robert Witherspoon, Supervisor
Huron Township
Port Hope, Michigan 48468

Mr. Daniel Duda, Supervisor
Lincoln Township
Bad Axe, Michigan 48413

Mr. Edwin Schubring, Supervisor
Rubicon Township
Port Hope Rd.
Port Hope, Michigan 48468

Mr. Arthur Polk, Supervisor
Verona Township
1953 Tomillison Rd.
Bad Axe, Michigan 48413

Mr. Nathan Kaufman, Supervisor
Gore Township
Port Hope, Michigan 48468

County Board of Commissioners
County Seat
Bad Axe, Michigan 48413

Sec., Conf. of Mich. Archaeology
The Museum/M.S.U.
East Lansing, MI 48823

Mr. Karl R. Hosford
Michigan Dept. of Natural Resources
Chief, Division of Land Resource Program
P.O. Box 30028
Lansing, MI 48909

Mrs. William Klingbail
ECC, 56 Hawthorne
Grosse Pointe, MI 48236

Mr. Larry Witte
Michigan Dept. of Natural Resources
Chief, Water Mgmt. Division
P.O. Box 30028
Lansing, MI 48909

West Michigan Regional Planning
Commission
1204 People's Building
60 Monroe at Ionia
Grand Rapids, MI 49502

Michigan Dept. of Transportation
P.O. Box 30050
Lansing, MI 48909

Connie Ferguson
Southcentral Michigan Planning Council
Conners Hall-Nazareth College
Nazareth, MI 49074

Capt. J.V. Cook, Port Development Sec.
Michigan Dept. of Transportation
P.O. Box 30050
Lansing, MI 48909

Michigan Department of State
State Historic Preservation Ofc.
3423 North Logan Street
Lansing, MI 48918

Michigan United Conservation Clubs
P.O. Box 30235
Lansing, MI 48909

Mr. Terry L. Yonker, Exec. Sec.
Mich. Env. Review Board,
Dept. of Mgmt. and Bud.
Second Floor, Lewis Cass Bldg.
Lansing, MI 48913

Adv. Council for Environ. Quality
Room #1, The Captiol
Lansing, MI 48903

Michigan Department of Commerce
Michigan Waterways Commission
Lansing, MI 48913

Mr. David A. Merchant, Div. Engr.
Michigan Divn, Dept. of Transp.
Box 147
Lansing, MI 48901

Exec. Ofc. of Gov./Planning Coord.
Lewis Cass Building
Lansing, MI 48913

Representative Mary Brown
State Representative
Room 306 Mutual Building
Lansing, MI 48901

Chief, Ofc of Environmental Review
Department of Natural Resources
P.O. Box 30028
Lansing, MI 48909

U.S. Dept. of the Interior
Division of Ecological Services
1405 S. Harrison Rd.
East Lansing, MI 48823

Senator Kerry Kammer
17th District
Capitol Building
Lansing, MI 48909

U.S. Dept. of Agriculture
Soil Conservation Service
1405 South Harrison Road
East Lansing, MI 48823

President
Village of Caseville
Main Street
Caseville, MI 48725

Jay B. Re[illegible], [illegible]ional Representative
National [illegible] Society-Central Midwest
990 Au[illegible]od Road
Dayton, OH 45414

Officer in Charge
Saginaw River Station
USCG
Bay City, MI 48707

Mimi Becker, President
Great Lakes Tomorrow
Box 735
Hiram, OH 44234

Hercules Incorporated
Harbor Beach, MI 48441

Ida Ruppe Library
Port Clinton, OH 43452

Mr. Art Chomistek
Dow Chemical U.S.A.
566 Building
Midland, MI 48640

Libraries
U.S. Government Pntg Off-Pub. Doc. Whrse.
Eisenhower Ave.
Alexandria, VA 22304

West Michigan Shoreline Reg.
Dvmt. Comm.
500 Hackley Bank Bldg.-Fifth Floor
Muskegon Mall
Muskegon, MI 49440

Mr. Joel Eiseman
Office of Environmental Analysis
Federal Maritime Comm., Rm/9102
1100 L Street, N.W.
Washington, D.C. 20573

Dan Spalink
Izaak Walton League
855 28th SE
Grand Rapids, MI 49508

Mr. Robert J. Stern, Acting Director
Division of NEPA Affairs, Dept. of Energy
Mail Station E-201, GTN
Washington, D.C. 20545

Dr. Jack M. Heinemann, Adv Env Qual
Federal Energy Regulatory Comm.
825 North Capitol St. N.E.
Washington, D.C. 20426

Director, Environmental Impact Division
Federal Energy Regulatory Comm.
New P.O. Bldg, 12th and Penns. Ave., NW
Washington, D.C. 20461

Advisory Council on Historic
Preserv.
1522 K. Street, N.W., Suite 430
Washington, D.C. 20005

Director, Ofc of Env Project Review
Dept. of the Interior
Washington, D.C. 20240

U.S. Forest Service
370 Reed Road
Broomall, PA 19008

National Marine Fisheries Service
3300 Whitehaven Parkway
(Ecosystems Qual.)
Washington, D.C. 20235

Federal Emergency Mgmt. Agency
Regional Office
26 Federal Plaza
New York, NY 10007

Sidney Galler, Dep. Asst. Sec/Env Affrs.
U.S. Department of Commerce
Washington, D.C. 20230

Sierra Club
140 West Gorham Street
Madison, WI 53703

Honorable Carl Pursell
Representative in Congress
510 E. 3rd Street
Monroe, MI 48161

Mr. G. Vavoulis, HUD
300 South Wacker Dr.
(Env Clear Ofcr)
Chicago, IL 60606

Mr. Fred Schmidt, Documents Librarian
Colorado State University Libraries
Fort Collins, CO 80521

Environmental Protection Agency,
Reg V
230 South Dearborn Street
Chicago, IL 60606
Attn: Office of Environmental
Review

Perry Stearns, M.D.
Dir., Wayne Co. Health Dept.
Eloise, MI 48132

Loren A. Whittner
CNA Building-Room 1402
55 East Jackson Blvd.
Chicago, IL 60604

Michigan Natural Areas Council
University of Michigan,
1800 N. Dixboro
Ann Arbor, MI 48105

U.S. Department of Trans.
Federal Highway Administration
18209 Dixie Highway
Homewood, IL 60430

Greenpeace - Ms. Robin McClellan
530 S. State Street
M: Union Box 53
Ann Arbor, MI 48109

H. Paul Friesema, Ctr. for
Urban Affairs
Northwestern University
2040 Sheridan Road
Evanston, IL 60201

Mr. Sol Baltimore, Director
American Lung Assoc, of
Southeastern Mich.
28 W. Adams Street
Detroit, MI 48226

NSBE
1999 Sheridan Road
Northwestern University
Evanston, IL 60201

Mr. Robert Reid
President, TROUT UNLIMITED
19401 W. McNichols
Detroit, MI 48219

Honorable Carl Levin
United States Senate
Washington, D.C. 20510

Mr. Arthur L. Carpenter
Michigan Audubon Society
3646 S. John Hix Road
Wayne, MI 48184

Honorable Donald Riegel
United States Senate
Washington, D.C. 20510

Department of HUD
Elmer Binford Area Director
Room 1741 McNamara Building

Department of the Environment
Canada Ctr. for Inland Waters
P.O. Box 5050
867 Lakeshore Road
Burlington, Ontario L7R 4A6

Executive Director SEMCOG
810 Book Building
1249 Washington Boulevard
Detroit, MI 48226

Mayor
City of Harbor Beach
Harbor Beach, MI 48441

President
Village of Port Austin
Port Austin, MI 48467

Village Clerk
Village of Port Austin
P.O. Box 336
Port Austin, Michigan 48467

Mr. Dieter W. Kubish
410 Spezia
Oxford, MI 48051

President
Village of Pigeon
Pigeon, MI 48775

Charles George, Chairman
21043 LaSalle
Warren, MI 48089

Honorable Bob Traxler
House of Representatives
Washington, D.C. 20515

Mr. Robert Armbruster, Supervisor
Winsor Township
204 Berne St.
Pigeon, MI 48755

Coast Guard Marine Inspection Of.
Patrick V. McNamara Bldg.-Room 550
477 Michigan Avenue
Detroit, MI 48226

Mr. Herman Rathke, Supervisor
McKinley Township
6764 Berne Rd.
Pigeon, MI 48755

Officer in Charge
Harbor Beach Depot
USCG
Harbor Beach, MI 48441

Mr. Richard Warchuck, Supervisor
Sherman Township
Rt. #2
Harbor Beach, MI 48441

City Engineer
136 North First
Harbor Beach, MI 48441

Township Supervisor
Sand Beach Township
Box 300
Harbor Beach, MI 48441

City Clerk
149 North First
Harbor Beach, MI 48441

Mr. Tore Nilsen
228 N. Huron Avenue
Harbor Beach, MI 48441

Mr. John D. Berchtold
City of Harbor Beach
149 N. First Street
Harbor Beach, MI 48441

Mr. Joseph Vitek
Michigan United Conserv. Clubs
4629 Midway St.
Saginaw, MI 48603

Mr. Don J. Roggenbuck
Rd #1, Box 211
Ruth, MI 48470

Peggy L. Emerick
Township of Rubicon
Port Hope, MI 48468

Donna Rees
6973 Section Line Rd.
Harbor Beach, MI 48441

Earl and Mary Gougeon
Rt. 2, Box 28
Harbor Beach, MI 48441

Sharon Warren
Lone Tree Council
P.O. Box 421
Essexville, MI 48732

RPF Ecological Assoc.
ATTN: Robert W. Guth, Ph.D.
727 Reba Place
Evanston, IL 60202

Harbor Beach Veterinary Service
ATTN: Mr. Hentschl
8505 Sand Beach Rd.
Harbor Beach, MI 48441

Mr. Fred Yost
1016 16th St., N.W.
Suite 850
Washington, D.C. 20036

Gail Maurer
7197 Atwater Rd.
Ruth, MI 48470

Mr. John Decator
Detroit Edison Company
2000 Second Avenue, 357 ICT
Detroit, MI 48226

Joel J. Weber
Ruth Rd.
Ruth, MI 48470

Mr. Robert D. Duncanson
1677 N. Ruth Rd.
Harbor Beach, MI 48441

7. LIST OF PREPARERS

7.01 The following Corps personnel were primarily responsible for the preparation of this document.

Name	Expertise
Daniel R. Allen	Landscape Architecture
Steven W. Congdon	Physical Science
John Collis	Geographer
Abram J. Nicholson	Civil Engineering

7.02 The data base around which this document was organized was largely gathered by consultants to Nicholson. These consultants consisted of:

Consultant	Activity
Hazleton Environmental Sciences Corp. 1500 Frontage Road Northbrook, IL 60062	Terrestrial Baseline Studies
Harding-Lawson Associates 125 Windsor Drive Suite 107 Oak Brook, IL 60521	Geotechnical Engineering Services
Dames and Moore Inc. 1550 Northwest Highway Park Ridge, IL 60068	Hydrogeological Studies

8. REFERENCES

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9. INDEX

10. APPENDICES

APPENDIX 1

Public Notice and Pertinent Correspondence

DEPARTMENT OF THE ARMY

DETROIT DISTRICT, CORPS OF ENGINEERS
BOX 1027
DETROIT, MICHIGAN 48231

REPLY TO
ATTENTION OF NCECO-LP Process No. 792253C/79-11-129G 8 May 1980

JOINT PUBLIC NOTICE

PROPOSED MAINTENANCE DREDGING IN LAKE HURON AND DISPOSAL OPERATIONS IN A LOW-LYING/WETLAND AREA ADJACENT TO LAKE HURON AT HARBOR BEACH, MICHIGAN

1. The Detroit Edison Company, 2000 Second Avenue, Detroit, Michigan, has made application for permits to do work described in paragraph #2 to:

a. The Detroit District U.S. Army Corps of Engineers for a Department of the Army permit under authority of Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act of 1977, to perform maintenance dredging in Lake Huron offshore the Harbor Beach Power Plant; also to deposit the dredged material in a low-lying/wetland area adjacent to Lake Huron in Huron County at Harbor Beach, Michigan. A portion of the disposal area is identified as being a wooded marsh on the U.S. Geological Quadrangle Harbor Beach, Michigan, dated 1970.

b. The State of Michigan, Water Quality Division for certification of this proposed work under Section 401 of PL 92-500, for compliance with the applicable provisions of Section 301, 306, and 307 of the Act. This statement has the approval of the Michigan Water Quality Division and constitutes its public notice as required by Section 401 of the Act.

c. The State of Michigan, Department of Natural Resources, for a permit under authority of 1955 P.A. 247.

2. As shown on the attached plan(s), the unloading facility and approach area for the Harbor Beach Power Plant will be annually dredged to provide and maintain a maximum depth of 22.0 feet below Low Water Datum elevation of 576.8 feet on International Great Lakes Datum. During the initial dredging operation approximately 325,000 cubic yards of organic silt and silty clay will be removed. Thereafter, an average of about 32,500 cubic yards of smiliar material will be dredged on an annual basis.

3. The dredging will be accomplished by using a hydraulic hopper-type dredge. The hopper dredge uses drag arm suction units to pull material from the bottom of the harbor and pump it into the hoppers aboard the ship. When the hoppers are filled to capacity, the dredge moves to the designated area and pumps the material through a hydraulic pipeline into a disposal area located about 1.5 miles northwesterly of the dredging site. The pipeline route and disposal area, except where the pipeline will cross M-25 and Rapson Road, will be located on Edison-owned property. Culverts or trestles will be provided so that the pipeline will not impact local traffic or streams. Refer to drawing No. 6 for pipeline route and disposal area location.

4. As detailed on drawing Nos. 7-9, the disposal area is a low-lying area about 55 acres in size bounded on the west by a high natural bluff, on the south by Rapson Road and on the east by M-25. Prior to commencement of disposal operations, a containment barrier will be constructed along the northerly, easterly and southerly perimeter of the disposal area. Also, all existing drains located within the disposal area will be sealed off. The containment barrier will be constructed of approximately 145,000 cubic yards of clay obtained from an on-site borrow area. When completed, the disposal area will have an approximate 1,000,000 cubic yard holding capacity.

5. During dredging/disposal operations, the disposal area will be operated as a steady state discharge-decant operation. To accomplish this a overflow weir, as detailed on drawing No. 10, will be located at the northeastern corner of the disposal area. The weir will have adjustable level stop logs in order to allow for settlement of solids and control the volume/rate of excess water discharge from the disposal area. The excess water from the weir discharges into an existing drain which in turn empties into Lake Huron about 0.5 mile downstream from the weir. Refer to drawing No. 11 for water return route. A monitor system will be implemented to assure water quality during excess water discharge operations.

6. The purpose of the work is to provide and maintain adequate depths for commercial vessels delivering coal to the Harbor Beach Power Plant. Also, to provide a permanent disposal area for safe storage of the sediments removed from the harbor at Harbor Beach.

7. The applicant has not indicated that he has received or requested any other governmental authorization.

8. This notice is being published in compliance with Title 33 Code of Federal Regulations 320-330 and Michigan 1955 P.A. 247. Any interested parties and agencies desiring to express their views concerning the proposed work may do so by filing their comments in writing no later than 4:30 P.M., 30 days from the date of issuance of this notice. All responses must refer to public notice process number 792253C 79-11-1296. A lack of response will be interpreted as meaning that there is no objection to the permit application.

9. Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider this application. Requests for public hearings shall state, with particularity, the reasons for holding a public hearing.

10. Objections or views related to:

a. State water quality certification should be filed with the State of Michigan, Water Quality Division, Stevens T. Mason Building, Lansing, Michigan 48926.

b. Items other than certification should be filed with the District Engineer, Detroit District, Corps of Engineers, P.O. Box 1027, Detroit, Michigan 48231, and/or Michigan Department of Natural Resources, Land Resources Program Division, P.O. Box 30028, Lansing, Michigan 48909.

11. The Corps and the DNR will exchange comments received after closing of the 30 day response period to the public notice.

12. The decision whether to issue the Department of the Army and/or State permits will be based on independent conclusions and decisions by the Corps of Engineers and the Michigan Department of Natural Resources, respectively, after evaluation of the probable impact of the proposed activity on the public interest. These decisions will reflect the national/state concerns for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered; among those are conservation, economics, aesthetics, general environmental concerns, historic values, fish and wildlife values, flood damage prevention, land use classification, navigation, recreation, water supply, water quality and, in general, the needs and welfare of the people. The permits will not be granted unless issuance is found to be in the public interest.

13. A preliminary determination indicates that the proposed activity will not affect any known listed endangered species or their critical habitat; therefore, no formal consultation between the Corps, U.S. Fish and Wildlife Service, and National Marine Fisheries Service is planned. If future determinations by any of these agencies indicate that the proposed permit action will affect listed endangered species or their critical habitat, formal consultation will be completed prior to final action.

14. This activity involves the discharge of dredged or fill material in to navigable waters. Therefore, the U.S. Army Corps of Engineers evaluation of the impact of the activity on the public interest will include application of the guidelines promulgated by the Administrator of the Federal Environmental Protection Agency, under the authority of Section 404 (b) of the Clean Water Act of 1977.

15. After review of the application, the U.S. Army Corps of Engineers has made a preliminary determination that an Environmental Impact Statement is required for the proposed work described in this notice.

HOWARD A. TANNER
Director
Michigan Dept. of Natural Resources

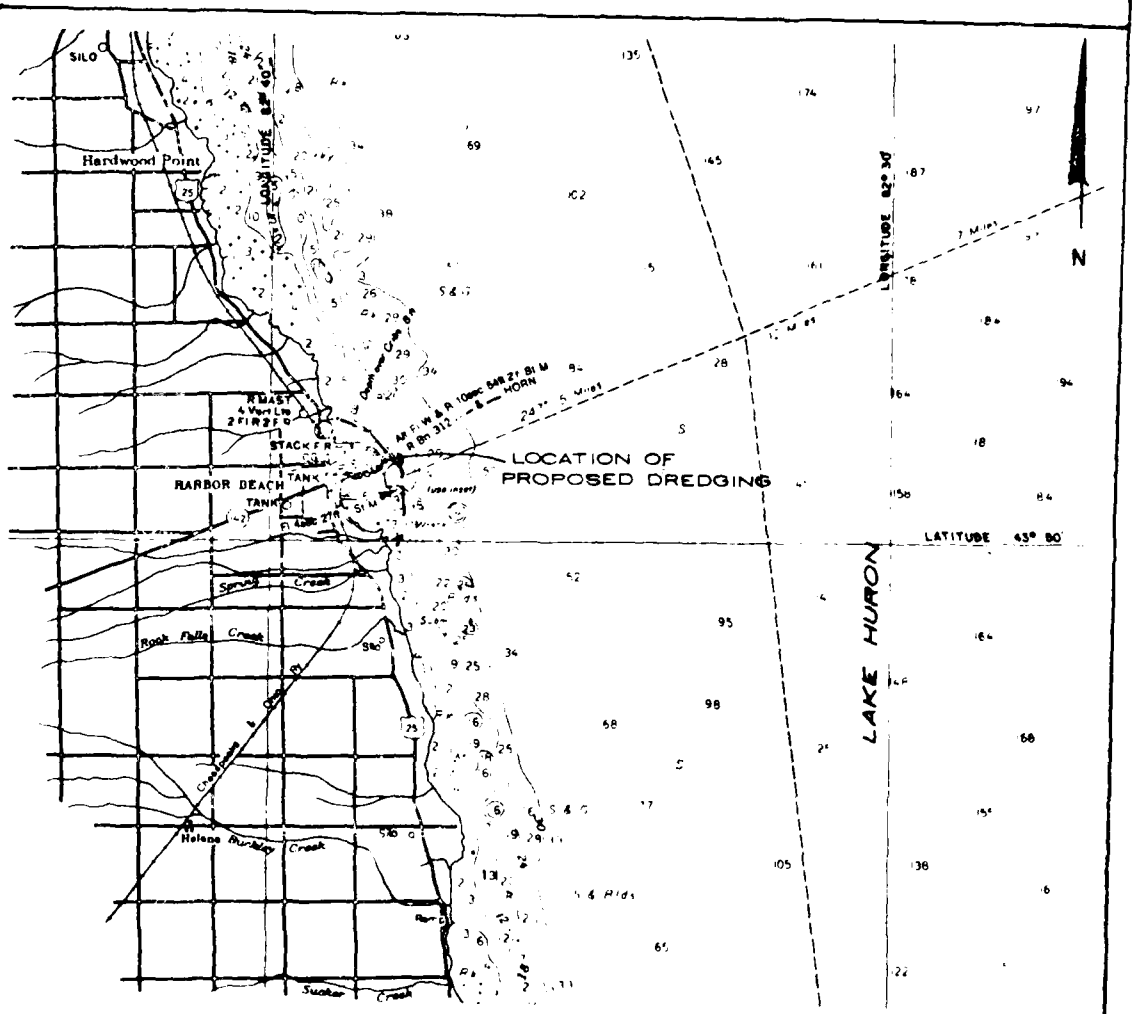
ROBERT V. VERMILLION
Colonel, Corps of Engineers
District Engineer

NOTICE TO POSTMASTERS:

It is requested that the above notice be conspicuously and continuously posted for 30 days from the date of issuance of this notice.

Proposed Permit No. 79-16-95

PROCESS# 792253L



REPRODUCTION FROM NOAA CHART NO 14862

DATUM IGLD 5768'

VICINITY MAP

SCALE OF MILES

0 1 2 3

ADJACENT PROPERTY OWNERS

(1) CITY OF HARBOR BEACH
855 NORTH HURON AVE., HARBOR BEACH, MI 48441

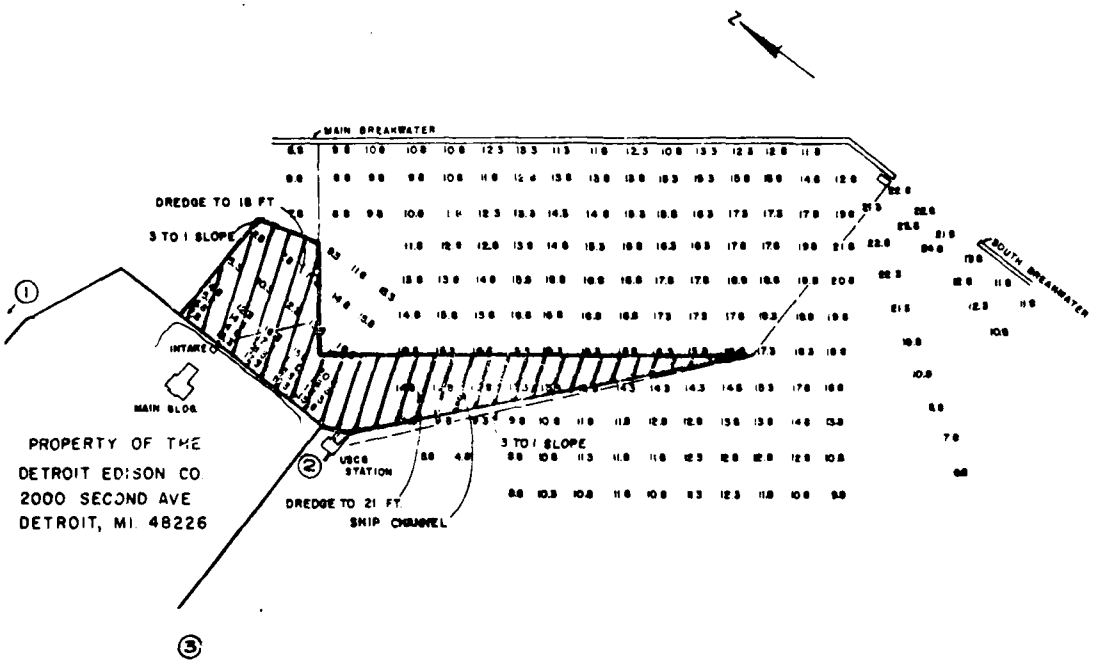
(2) CMDR OF U.S. COAST GUARD, 9th C.G. DISTRICT
MAIN POST OFFICE BLDG., CLEVELAND, OH

(3) DICKINSON'S MARINA
5 LYTLE, HARBOR BEACH, MI 48441

PROPOSED DREDGING

IN LAKE HURON AT THE HARBOR OF REFUGE, CITY OF HARBOR BEACH, COUNTY OF HURON, STATE OF MICHIGAN.
APPLICATION BY THE DETROIT EDISON CO
DATE: 11-8-79 1 OF 11

PROLESS # 79[illegible]



DATUM IGLD 5768'

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ADJACENT PROPERTY OWNERS

1. CITY OF HARBOR BEACH
   855 NORTH HURON AVE., HARBOR BEACH, MI. 48441
2. CMDR OF U.S. COAST GUARD, 9th CG. DISTRICT
   MAIN POST OFFICE BLDG., CLEVELAND, OH
3. DICKINSON'S MARINA
   5 LYTLE, HARBOR BEACH, MI. 48441

PROPOSED DREDGING

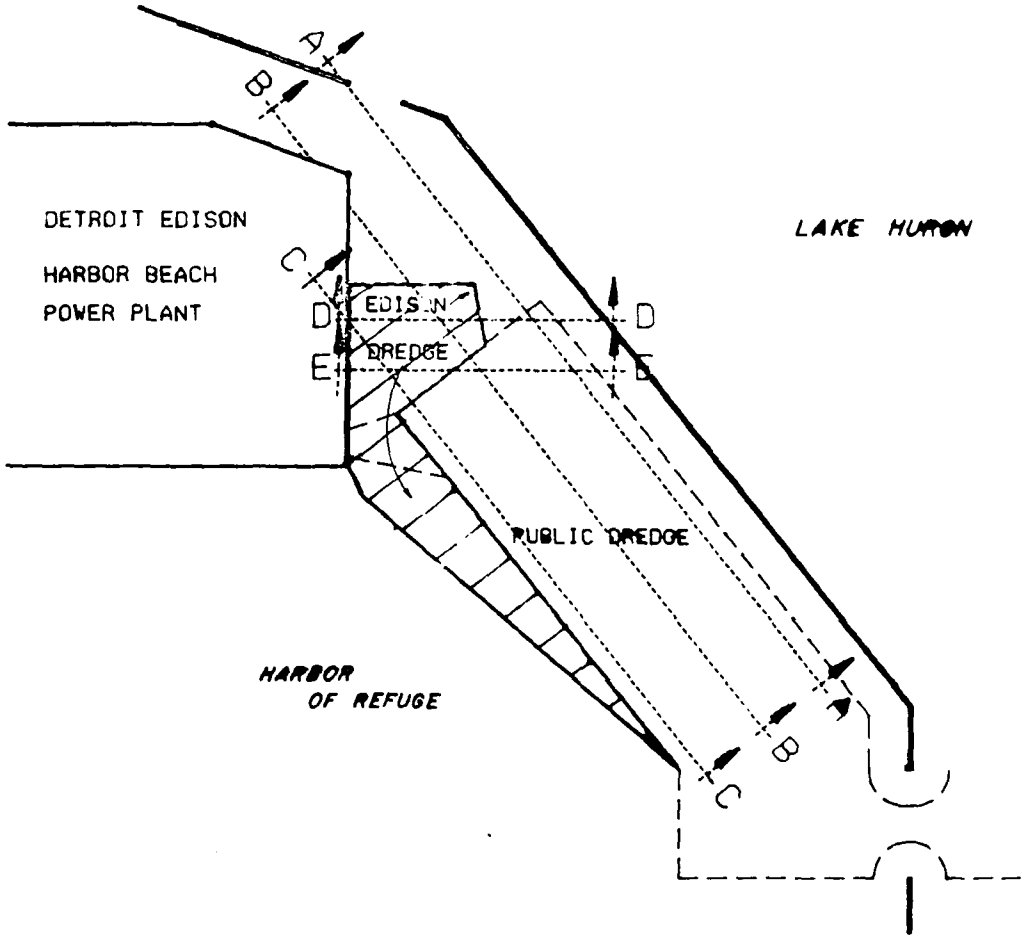
IN LAKE HURON AT THE HARBOR OF REFUGE, CITY OF HARBOR BEACH, COUNTY OF HURON, STATE OF MICHIGAN.

APPLICATION BY THE DETROIT EDISON CO

DATE: 11-8-79 3 OF 11

PROCESS # 792253C

PROPOSED DREDGE AREA



DATUM IGLD 576.8'

PROPOSED DREDGING

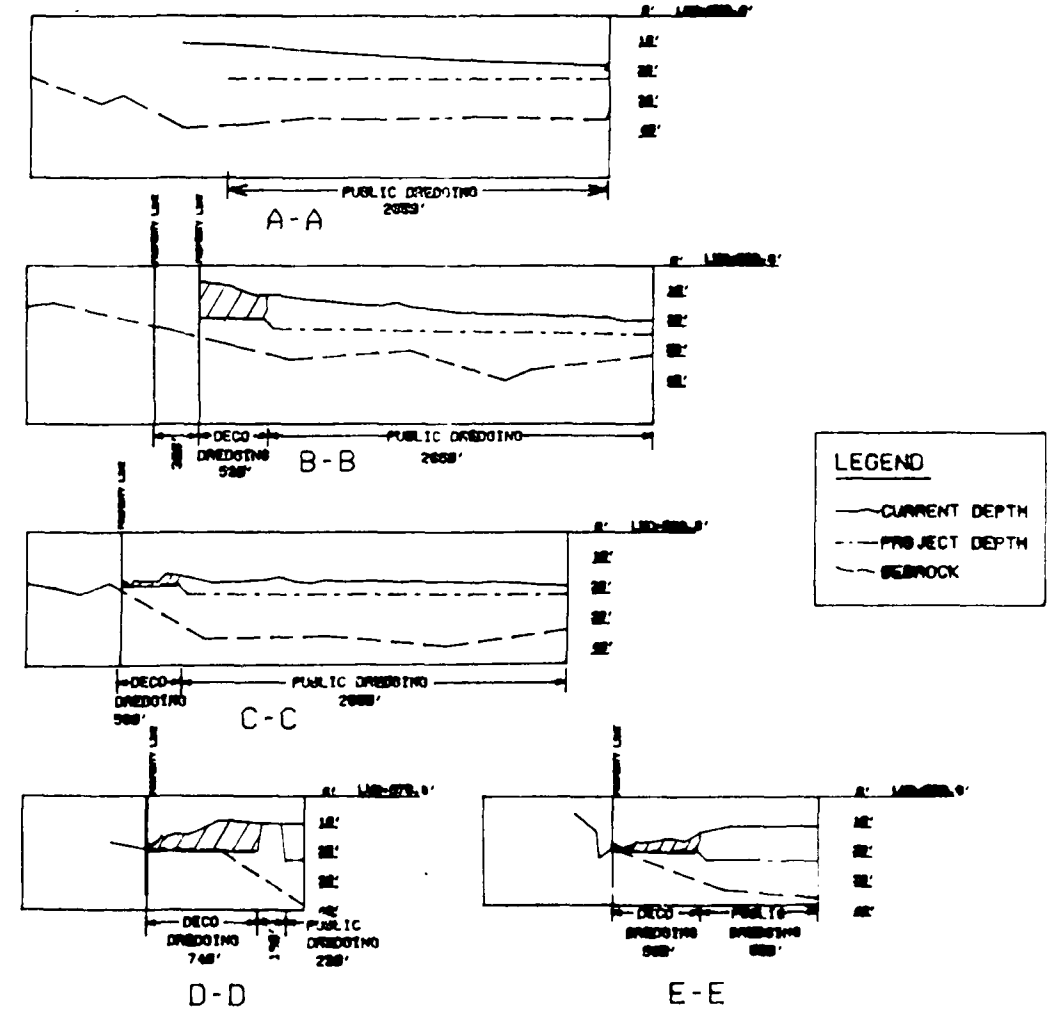
IN LAKE HURON AT THE HARBOR OF REFUGE, CITY OF HARBOR BEACH, COUNTY OF HURON, STATE OF MICHIGAN

APPLICATION BY THE DETROIT EDISON CO

DATE 11-8-79 SHEET 4 OF 11

PROCESS # 792253C

CROSS SECTIONS OF PROPOSED DREDGE AREA



DATUM IGLD 5768'

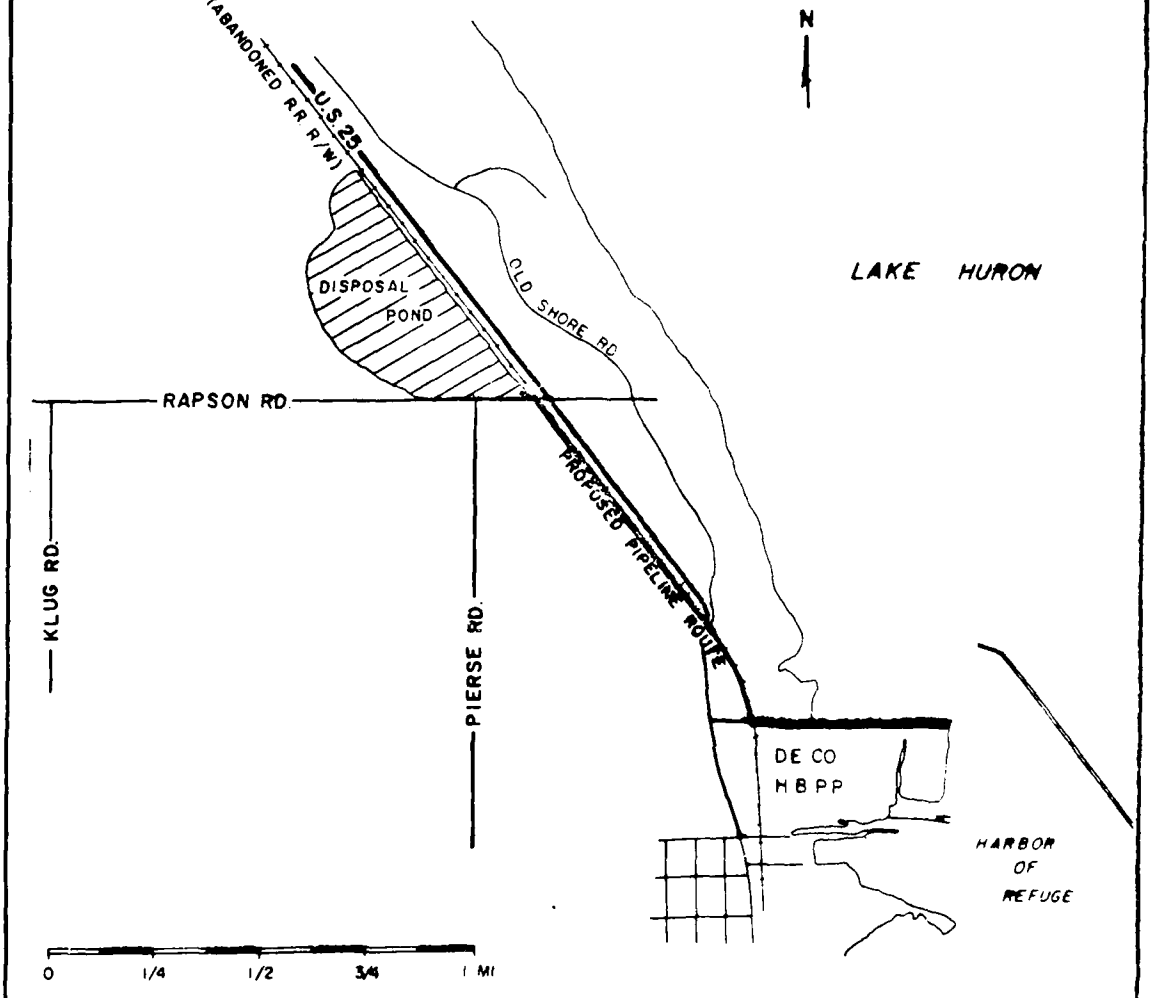
PROPOSED DREDGING

IN LAKE HURON AT THE HARBOR OF REFUGE, CITY OF HARBOR BEACH COUNTY OF HURON, STATE OF MICHIGAN

APPLICATION BY THE DETROIT EDISON CO

DATE 11-8-79 SHEET 5 OF 11

PROCESS # 792253C



DATUM IGLD 576.8'

PIPELINE ROUTE

PROPOSED DREDGING

IN LAKE HURON AT THE HARBOR OF REFUGE, CITY OF HARBOR BEACH, COUNTY OF HURON, STATE OF MICHIGAN

APPLICATION BY THE DETROIT EDISON CO

DATE 11-8-79 SHEET 6 OF 11

AD-A111 288 CORPS OF ENGINEERS DETROIT MI DETROIT DISTRICT F/G 13/2
DRAFT ENVIRONMENTAL IMPACT STATEMENT. MAINTENANCE DREDGING AND --ETC(U)
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2 OF 3
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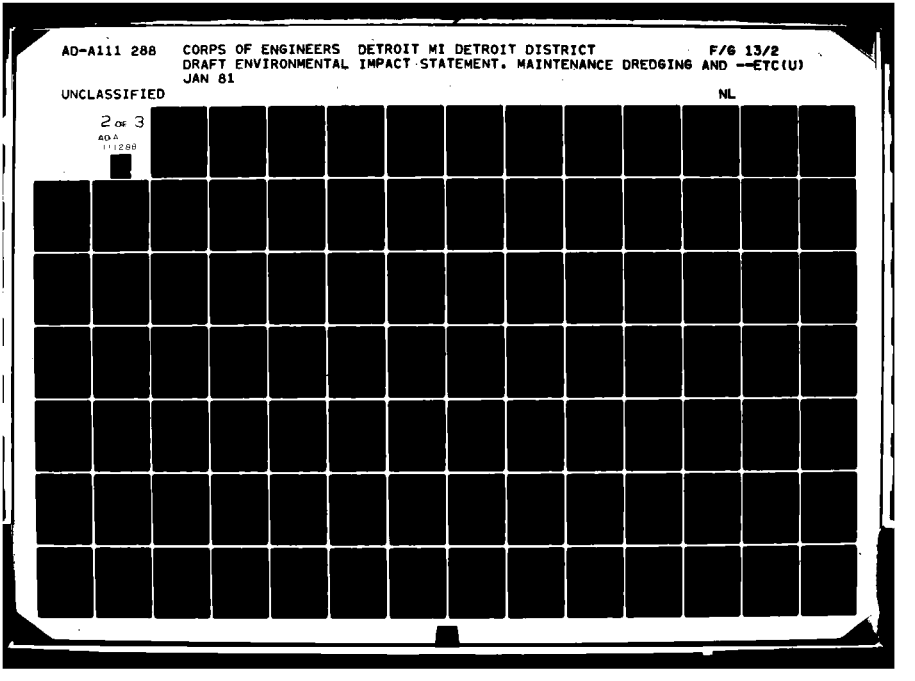

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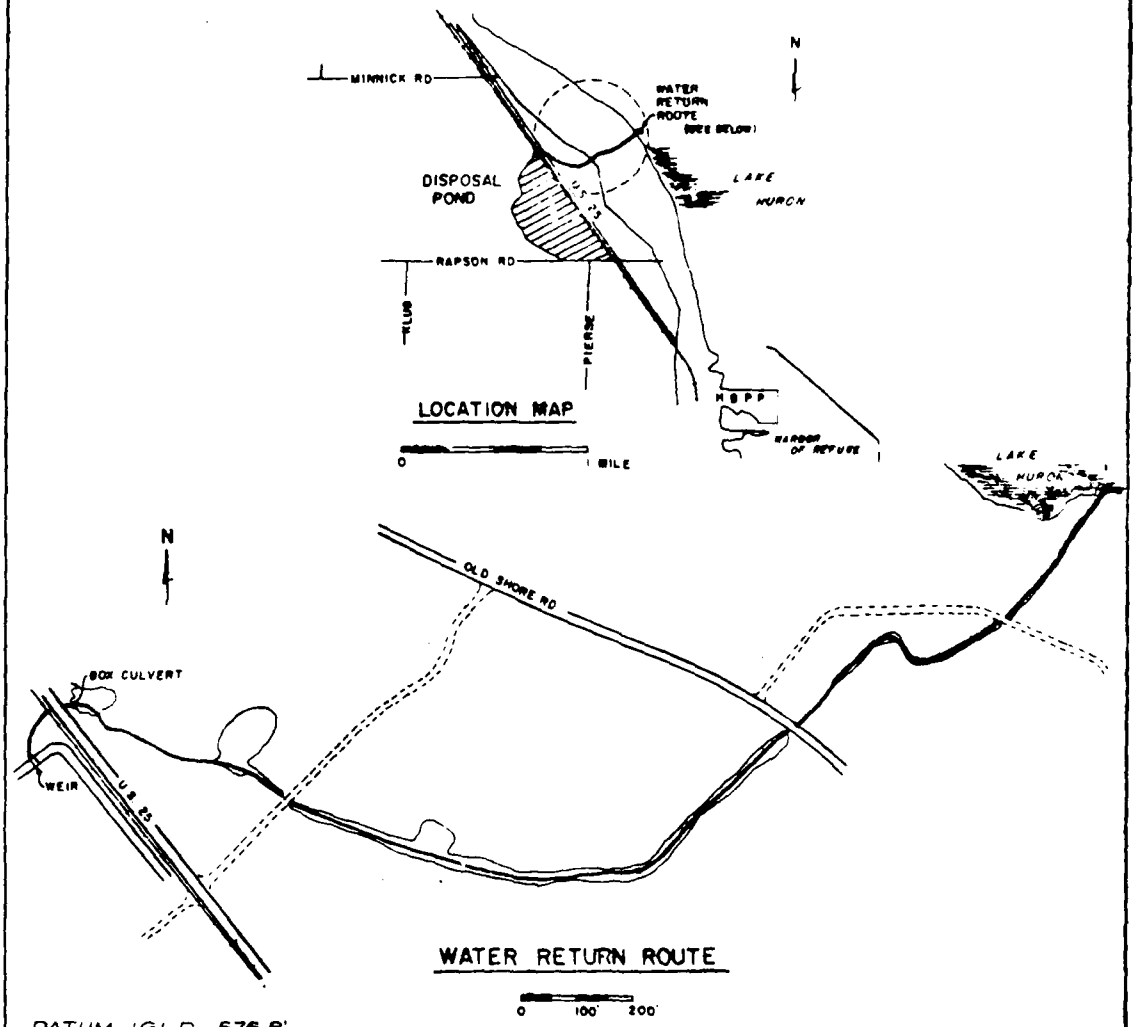


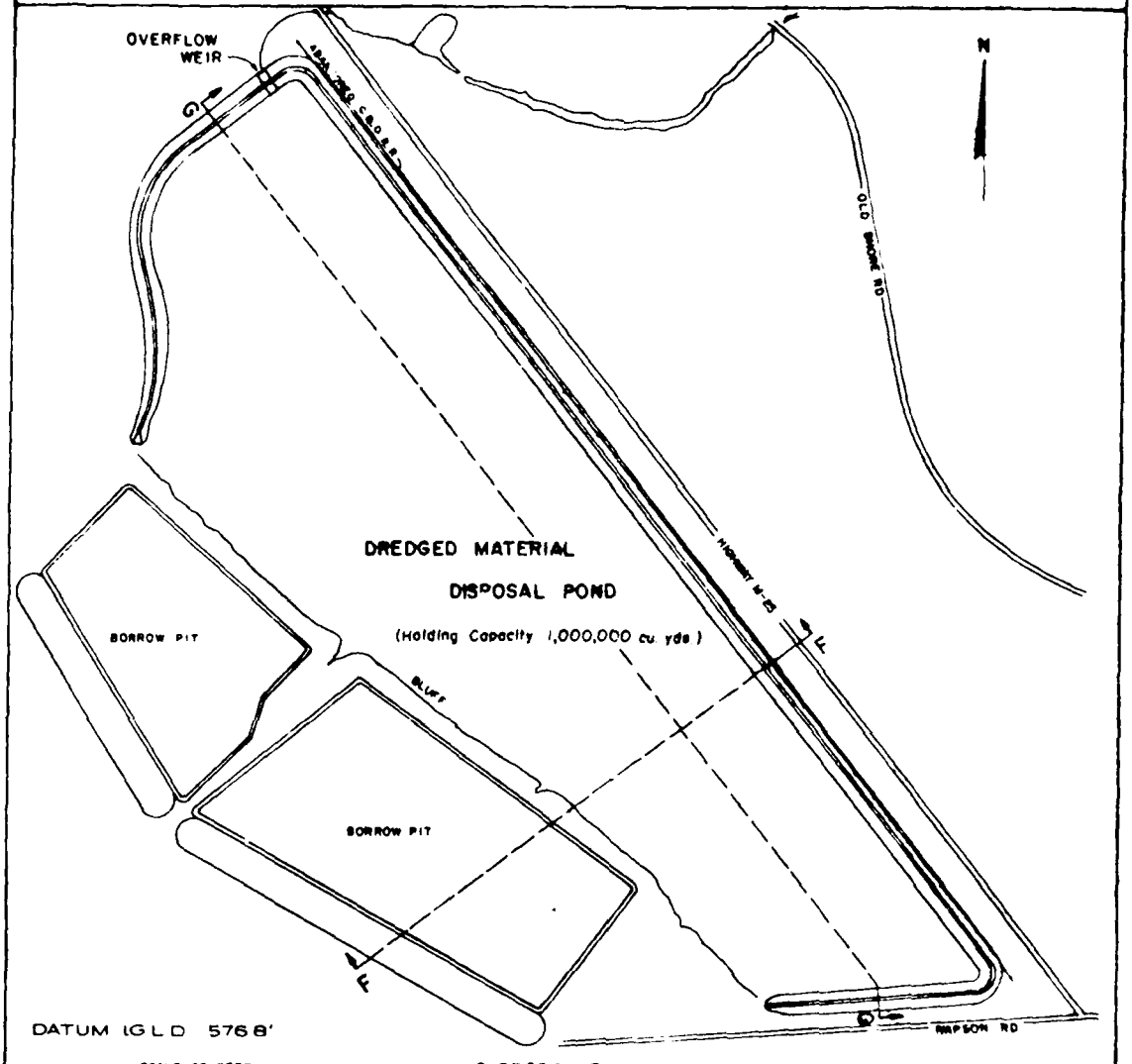
PROPOSED DREDGING

IN LAKE HURON AT THE HARBOR OF REFUGE, CITY OF HARBOR BEACH, COUNTY OF HURON, STATE OF MICHIGAN.

APPLICATION BY THE DETROIT EDISON CO

DATE: 11-8-79 SHEET 11 OF 11

PROCESS # 792253C



PROPOSED DREDGING

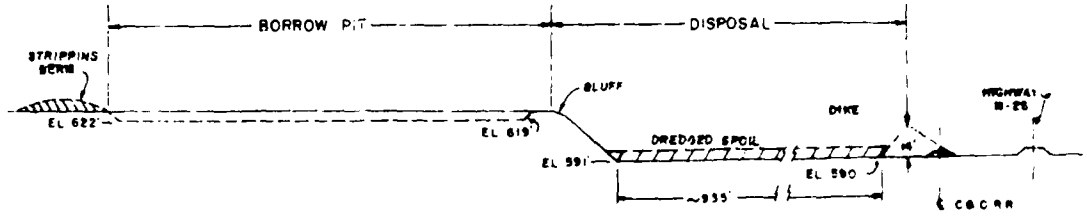
IN LAKE HURON AT THE HARBOR OF REFUGE, CITY OF HARBOR BEACH, COUNTY OF HURON, STATE OF MICHIGAN

APPLICATION BY THE DETROIT EDISON CO

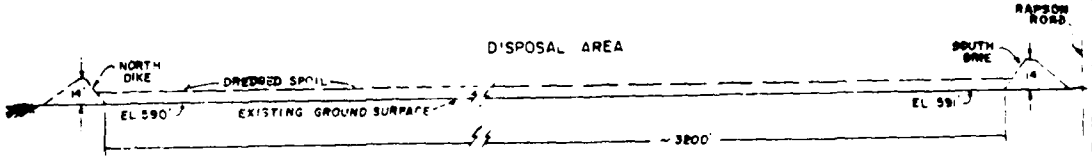
DATE: 11-8-79 SHEET 7 OF 11

PROCESS # 792253C

SECTIONAL VIEWS
DREDGE DISPOSAL POND AND BORROW PITS



SECTION F-F
LOOKING NORTHWEST



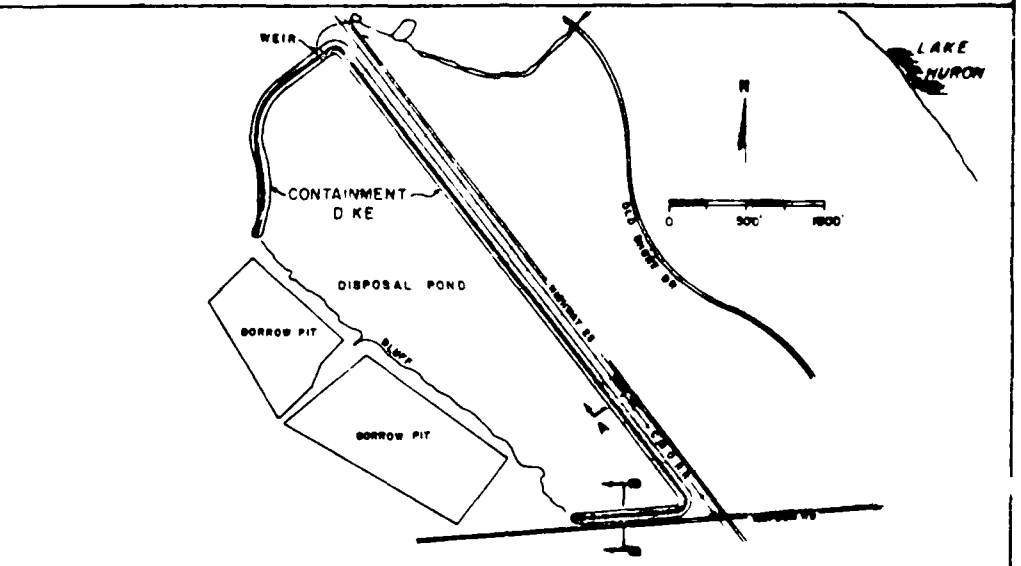
SECTION G-G
LOOKING NORTHEAST

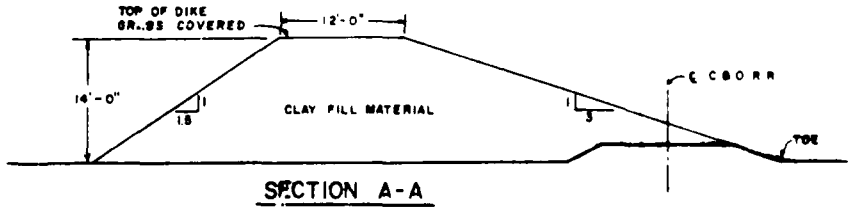
DATUM IGLD 5768'

PROPOSED DREDGING
IN LAKE HURON AT THE HARBOR OF REFUGE, CITY OF HARBOR BEACH, COUNTY OF HURON, STATE OF MICHIGAN

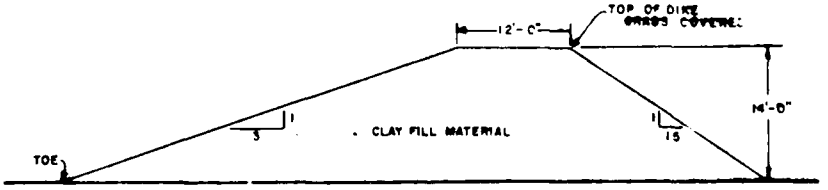
APPLICATION BY THE DETROIT EDISON CO
DATE 11-8-79 SHEET 8 OF 11

PROCESS # 792253C





SECTION A-A



SECTION B-B

DATUM IGLD 576.8'

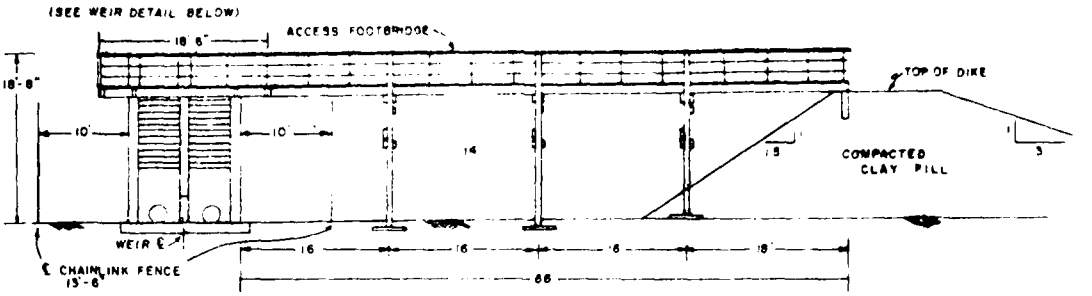
PROPOSED DREDGING

IN LAKE HURON AT THE HARBOR OF REFUGE, CITY OF HARBOR BEACH, COUNTY OF HURON, STATE OF MICHIGAN

APPLICATION BY THE DETROIT EDISON CO

DATE 11-8-79 SHEET 9 OF 11

PROCESS # 792253



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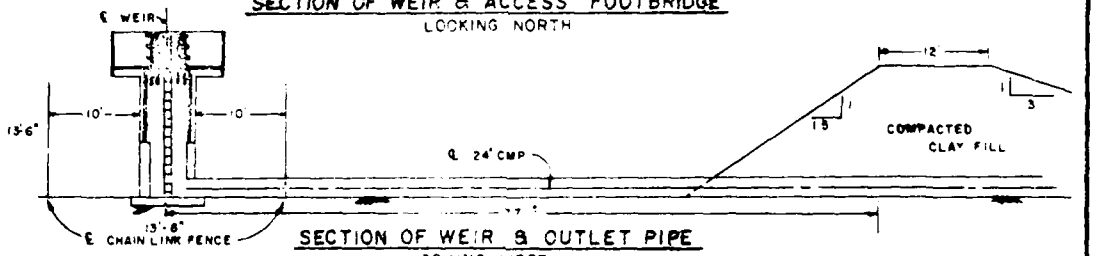
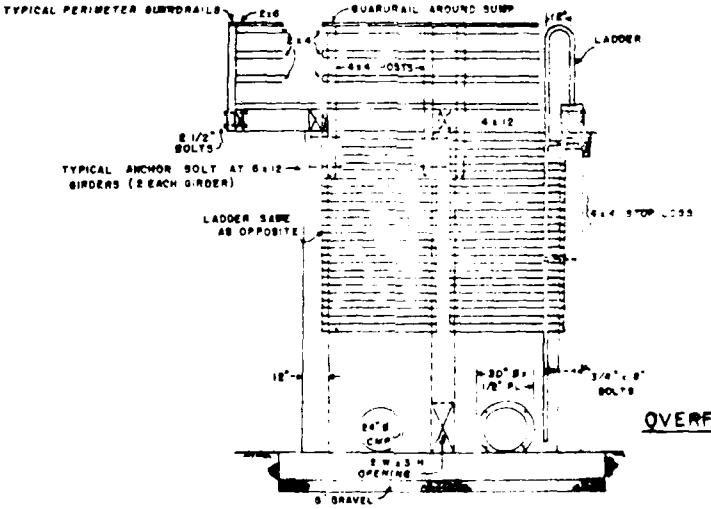


SECTION OF WEIR & OUTLET PIPE
LOOKING WEST



OVERFLOW WEIR DETAIL

DATUM IGLD 576.8'

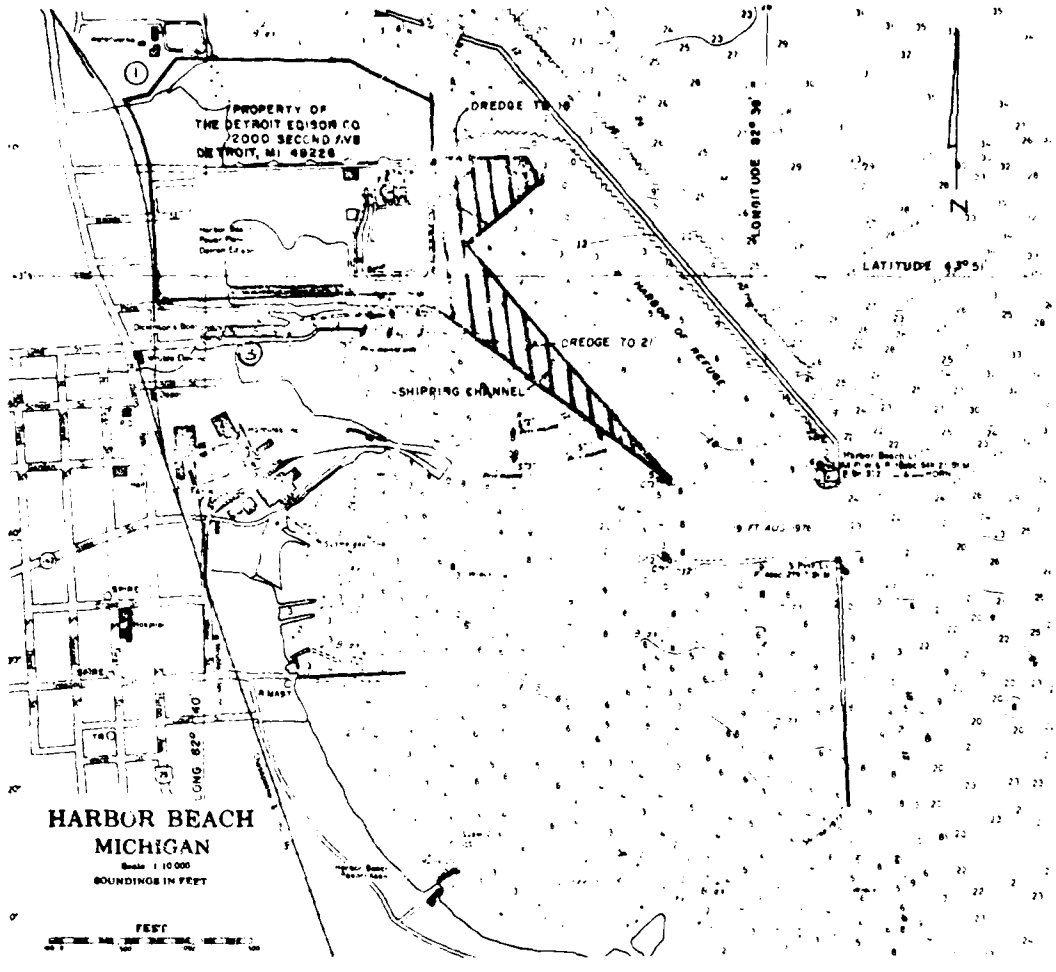
PROPOSED DREDGING

IN LAKE HURON AT THE HARBOR OF REFUGE, CITY OF HARBOR BEACH, COUNTY OF HURON, STATE OF MICHIGAN

APPLICATION BY THE DETROIT EDISON CO

DATE 11-8-79 SHEET 10 OF 11

PROCESS # 792253 –



REPRODUCTION FROM NOAA CHART NO 14862

LOCATION MAP

DATUM I.G.L.D. 1968

ADJACENT PROPERTY OWNERS

(1) CITY OF HARBOR BEACH
855 NORTH HURON AVE., HARBOR BEACH, MI 48441

(2) CMDR OF U.S. COAST GUARD, 9th C.G. DISTRICT
MAIN POST OFFICE BLDG., CLEVELAND, OH

(3) DICKINSON'S MARINA
5 LYTLE, HARBOR BEACH, MI 48441

PROPOSED DREDGING

IN LAKE HURON AT THE HARBOR OF REFUGE, CITY OF HARBOR BEACH, COUNTY OF HURON, STATE OF MICHIGAN.

APPLICATION BY THE DETROIT EDISON CO

DATE: 11-8-79 2 OF 11

STATE OF MICHIGAN

NATURAL RESOURCES COMMISSION
JACOB A. BENEDICT
CARL T. JOHNSON
E. M. LAITALA
HILARY F. SNELL
HARRY H. WHEELER
JOAN L. WOLFE
CHARLES G. YOUNGLOVE

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

HOWARD A. TANNER, Director

August 7, 1980

Mr. Abram Nicholsen, Chief
Environmental Review Branch
Army Corps of Engineers
Detroit, Michigan 48226

Re: Harbor Beach EIS and
Scoping Meeting

Dear Mr. Nicholsen:

I wish to re-emphasize Department of Natural Resources' request that the Harbor Beach Environmental Impact State (EIS) include adequate descriptions of dredging and dredge spoil disposal activities.

The degree of local public interest recommends against abbreviating descriptions of these activities or their impacts. Technically, however, our interest is that the project proposal have sufficient hydrogeology, liner thickness, liner permeability, dewatering, capping and end use information for review.

Though these items were not specifically noted in scoping meeting notes, I understand from your comments that they will be included.

Thank you for the opportunity to participate.

Sincerely,

Gary Gettel
Environmental Enforcement Division

GG:sct

MICHIGAN
THE GREAT LAKE STATE

MICHIGAN DEPARTMENT OF STATE
RICHARD H. AUSTIN SECRETARY OF STATE

LANSING
MICHIGAN 48918

MICHIGAN HISTORY DIVISION
ADMINISTRATION, ARCHIVES
HISTORIC SITES AND PUBLICATIONS
3423 N. Logan Street
517/373-0510
STATE MUSEUM
505 N. Washington Avenue
517/373-0515

August 28, 1980

Mr. P. McCallister
Chief, Engineering Division
Department of the Army
Corps of Engineers
Box 1027
Detroit, Michigan 48231

Re: ER-4284
NCECO-LP

Dear Mr. McCallister:

Our staff has reviewed the following project and concludes that it will have no effect on any cultural resources either eligible for or listed on the National Register of Historic Places.

Maintenance dredging and disposal operations, Lake Huron, Harbor Beach, Michigan.

If you have further questions, please contact Donald E. Weston, Environmental Review Coordinator for the Michigan History Division at 517/373-0510. (Please refer to the reference number above.) Thank you for giving us the opportunity to comment.

Sincerely,

Donald E Weston
for

Martha M. Bigelow
Director, Michigan History Division
and
State Historic Preservation Officer

MMB/DEW/mjr

United States Department of the Interior
FISH AND WILDLIFE SERVICE
IN REPLY REFER TO
East Lansing Area Office
Manly Miles Building Room 202
1405 South Harrison Road
East Lansing, Michigan 48823

June 6, 1980

Colonel Robert V. Vermillion
U.S. Army Engineer District
Detroit
Detroit, Michigan 48231

Dear Colonel Vermillion:

We have reviewed public notice NCEO-LP 79425[illegible]/79-11-[illegible]G, dated May 8, 1980, concerning an application from the Detroit Edison Company for a Section 10/404 permit to perform maintenance dredging in Lake Huron offshore the Harbor Beach Power Plant; also to deposit dredge spoils in a low lying/wetland area adjacent to Lake Huron at Harbor Beach, Huron County, Michigan. The purpose of the work is to provide and maintain adequate water depths for commercial vessels delivering coal to Detroit Edison's Harbor Beach Power Plant. The project will also provide a permanent safe-storage disposal area for sediments removed from the harbor.

An on-site investigation was conducted by biologists from our East Lansing Ecological Services Field Office on June 3, 1980. The investigation revealed that approximately 90 percent of the proposed disposal area is wetland. The remaining 10 percent of the area, located adjacent to Ranson Road and at the northern terminus of Pierse Road, appears to be a previous fill now populated with upland species of grasses, weeds, and small shrubs.

The wetland area is utilized by marsh birds, song birds, reptiles, amphibians, and marsh animals. It is probable that waterfowl use the area. The fringe areas are utilized by upland game and non-game species of birds and mammals. This is evidenced by numerous deer trails, rabbit seats, and the presence of non-game birds noted during the investigation. The elimination and/or destruction of this area would constitute a great loss to the integrity and ability of this area to sustain and produce a diverse wildlife population. We do not oppose the proposed maintenance dredging in Lake Huron to provide adequate water depths for commercial vessels, however, we do object to the disposal of any dredged spoil in the wetland area and recommend that a permit for disposal of dredged materials in the

wetlands be denied.

We have been informed that a public hearing regarding this proposal has been requested by concerned citizens of Harbor Beach. We request a notice of the pending hearing. If appropriate, the Fish and Wildlife Service may have other comments following the public hearing.

The opportunity to review the subject notice is appreciated.

Sincerely yours,

John Rozowski
Area Manager

cc: Director, Michigan DNR, Lansing, MI
U.S. EPA, Federal Activities Branch, Chicago, IL

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

REPLY TO ATTENTION OF

MAY 8 7 1980

Chief, General Regulatory Branch
Detroit District, Corps of Engineers
Department of the Army
Post Office Box 1027
Detroit, Michigan 48231

Dear Sir:

This is in response to your request for comments concerning the application by the Detroit Edison Company, under public notice 7[illegible]-79-11-1296, dated May 8, 1980.

We will hold our final comments in abeyance until we have reviewed the environmental impact statement on this proposal. We will be conducting on-site inspections in the near future and will inform you of our findings.

If you should have any questions concerning this letter, please contact Mr. Gordon Garcia, of my staff, at 312/886-6092.

Sincerely yours,

Elmer D. Shannon, Chief
Wetlands, Dredge & Fill Unit
Office of Environmental Review

cc: Mr. Clyde Odir, Field Supervisor, East Lansing Field Office, U.S. Fish and Wildlife Ser., 101 Manly Miles Bldg., 1405 S. Harrison Rd., East Lansing, Mi. 48823
M.R. Nielsen, Chief, Submerged Lands Management Section, Michigan DNR, P.O. Box 30028, Lansing, Michigan 48909

A-12

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION V
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

SEP 05 1978

Mr. P. McCallister
Chief, Engineering Division
U.S. Army Engineer District, Detroit
P. O. Box 1027
Detroit, Michigan 48231

Dear Mr. McCallister:

Thank you for your August 17, 1978, letter concerning the construction of a confined disposal facility at Harbor Beach, Michigan. In accordance to your letter request, we would be happy to reassess the disposal sites that were previously considered in Harbor Beach and assist your office in identifying possible new sites. We are sorry to see that Site 3 in the Sand Beach Township was abandoned because we believe the site could have been made environmentally sound. We would appreciate receiving a copy of the results of the ground water analysis study that was conducted in May 1978.

We encourage your office to seek a suitable agricultural land site(s) to place the dredge material. Our July 10, 1978, letter explains U.S. EPA's position on the placement of dredge spoil on agricultural lands and when such spoil material could be used for agricultural purposes. While we expect that an environmental assessment will still be conducted to evaluate the synergistic effects of using sediments containing high concentration of heavy metals for agricultural purposes, a preliminary evaluation by our Agency of the harbor's past sediment data reveals that controlled application of Harbor Beach dredged material to lands for agricultural purposes should not cause any significant environmental problems.

The old calculations of the zinc to cadmium ratio have been generally ruled ineffective as a tool to provide protection for crops or food chains. The proposed land application criteria (published in the February 6, 1978 Federal Register) established an annual loading rate for cadmium of 2 kg/hectare/year. According to our June 4, 1974, sediment survey, cadmium concentrations range from 7.1 to 8.8 mg/kg in the Harbor Beach sediments. These concentrations are far less than the land application criteria of 25 mg/kg, (February 6, 1978, Federal Register), which is the maximum concentration allowed at any site where crops are to be grown for direct human consumption. At this concentration, approximately 100 dry tons of dredge material could be applied per acre without exceeding EPA limits for cadmium. The spoil pH is in an adequate range so that lime additions do not appear necessary.

Since the cadmium content of the dredge spoil does not exceed 11.25 mg/kg, normal agronomic loading rates for nitrogen would probably be the controlling factor for land application. See Appendix VIII of EPA's Technical Bulletin - Municipal Sludge Management MCD-25 (EPA 430/9-77-004) for calculating the application rate of spoil for nitrogen. It is possible that the application rate of spoil for nitrogen may be as low as 15 to 20 tons of spoil per acre.

If the dredge material is placed on agricultural land and is to be used that year or the next year for agricultural purposes, we suggest that the dredge spoil be spread at loading rates not to exceed 20 dry tons per acre. A cover crop should be grown the first year, monitored for uptake, and depending upon concentrations found, plowed under, or removed and disposed of, in an acceptable manner. Row crops such as corn or soy beans could then be grown in the following year. However, the produced grains, beans, etc., should still be monitored at least for a few years to ensure the protection of the human food chain from toxic pollutants. This suggestion is based upon the assumption that the loading will be a one-time event, and normal agricultural practices will be continued in subsequent years with nitrogen additions to grow crops.

At this time, we do not anticipate the occurrence of any problems with metal uptake or contamination as long as application rates are controlled and potential effects are monitored.

Although sediments in the harbor are in the moderately polluted range, and are not grossly polluted, the alternative of open lake disposal for some or all of the material should be considered, using the section 404 review process. Through this process, it will be possible to determine if open lake disposal is an environmentally feasible alternative. On the basis of existing sediment data and knowledge of the harbor, additional information, as recommended by the section 404 guidelines (specifically bioassays), is necessary to determine if open lake disposal could be feasible. Note that whether or not open lake disposal is determined to be an environmentally feasible alternative, the 404 guidelines still require consideration of all feasible alternatives, including upland sites.

We appreciate the opportunity to provide assistance. Please contact Mr. Robert Kay at 312/353-2307 to arrange a field inspection of those sites delineated in your August 17, 1978, enclosures, and of possible agricultural lands that may be used for disposal.

Sincerely yours,

William D. Franz

William D. Franz, Acting Chief
Environmental Impact Review Staff
Office of Federal Activities

[illegible] 22, 19[illegible]

Department of the Army
Detroit District, Corps of Engineers
Box 1027
Detroit, Michigan [illegible]

Attention of: [illegible] Process No. [illegible]/7[illegible]-11-1[illegible]

Gentlemen:

We, the undersigned, petition the Army Corps of Engineers for a [illegible] meeting concerning Public Notice Process Number [illegible]-11-1[illegible]. [illegible] are concerned for the general [illegible] of the [illegible], odors, water supply, water quality and conservation of the natural habitat for the abundant wildlife of the area.

5-26-80 [illegible] [illegible] [illegible] Harbor Beach
5-26-80 Raymond [illegible] [illegible] Harbor Beach
5-26-80 [illegible] [illegible] [illegible] Harbor Beach
5-26-80 [illegible] [illegible] [illegible] Harbor Beach
5-26-80 [illegible] [illegible] [illegible]
[illegible] [illegible] Harbor Beach
5-26-80 [illegible] [illegible] Harbor Beach
5-26-80 [illegible] [illegible] Harbor Beach
5-26-80 August [illegible] [illegible] Harbor Beach
5-26-80 [illegible] [illegible] Harbor Beach
5-26-80 [illegible] [illegible] Harbor Beach
5-26-80 [illegible] Rapson Rd Harbor Beach
5-26-80 [illegible] [illegible] Rd Harbor Beach
5-26-80 Stephen [illegible] [illegible] Harbor Beach
5-26-80 Catherine [illegible] [illegible] Harbor Beach
5-26-80 Floyd [illegible] [illegible] Harbor Beach, Mi
5-26-80 [illegible] [illegible] [illegible] Rd Harbor Beach, Mi
5-26-80 Jim [illegible] 8950 Rapson Rd Harbor Beach Mi
5-26-80 [illegible] 8750 [illegible] Rd. Harbor Beach, Mi
5-26-80 [illegible] [illegible] Harbor Beach Mi
5-26-80 Margaret [illegible] [illegible] Dr. Harbor Beach Mi
5-26-80 [illegible] [illegible] [illegible] Beach [illegible]

A1-23

May 22, 1980

Department of the Army,
Detroit District, Corps of Engineers
Box 1027
Detroit, Michigan 48231

ATTN: NCEDC-LP Process No. 7922530/79-11-1293

Gentlemen:

We, the undersigned, petition the Army Corps of Engineers for a public meeting concerning Public Notice Process Number 7922530/79-11-1293. We are concerned for the general aesthetics of the area, odors, water supply, water quality and conservation of the natural habitat for the abundant wildlife of the area.

Deborah Swinea 1161 N. Shore Dr 48 5-26-80

David C Swinea 1161 N. Shore Harbor Beach MI 5-26-80

Thomas [illegible] [illegible] 5-27-80

Patricia [illegible] 5-27-80

Alene Winter 1093 N Shore Rd Harbor Beach 5-27-80

Raymond Winter 1093 N Shore Rd Harbor Beach 5-27-80

John Hebert 1042 N. Lake Shore Rd Harbor Beach, Mich 5-27-80

William Howe 1020 N Lakeshore Rd. Harbor Beach Mich 5-27-80

5-27-80 [illegible] Harbor Beach, Mich 5-27

5-27-80 [illegible]

5-27-80 [illegible]

5-27-80 [illegible] 1158 [illegible]

5/27/80 Paul S. [illegible]

5/27/80 [illegible]

5/27/80 Frederick Pilarek 1016 N Lakeshore Dr Harbor Beach Mich

A1-24

May 22, 19[illegible]

Department of the Army
Detroit District, Corps of Engineers
Box 1027
Detroit, Michigan 48231

Attention of: NCEED-H Process No. 7-2253/79-11-1298

Gentlemen:

We, the undersigned, petition the Army Corps of Engineers for a public meeting concerning Public Notice process Number 7-2253/79-11-1298 as are concerned for the general aesthetics of the area, odors, water supply, water quality and conservation of the natural habitat for the aquatic wildlife of the area.

Alex Wilkinson [illegible] Huron Road Mich 48176
Robert Whitehead [illegible] Mich " "
Clarence J. Lemmell Jr. 212 N. Huron, Harbor Beach, Mich.
[illegible]
Raquel Hensley 146 South Huron Harbor Beach, Mich.
[illegible]
[illegible] Harbor Beach
[illegible]
Grace Wendel 228 Second Street Harbor Beach, Mich
Al Wilkinson 165 Huron St Harbor Beach, Mich
Julianne Wilkinson 165 N Huron Harbor Beach Mich
[illegible]
N. Van Sant 1010 Huron Port Hope Mich
Mrs. Verda Daniel [illegible] Harbor Beach
Peter F. Kast 1135 N. Lakeshore Rd Mich
William Engel 1049 N. " " "

APPENDIX 2

Water and Sediment Quality Data

Sampling Data for Harbor Beach

State of Michigan Water Quality Standards

EPA Sediment Criteria

April 18, 1978

Mr. Richard Gutleber
Environmental Section
U.S. Army Corps of Engineers
P.O. Box 1027
Detroit, Michigan 42381

Dear Mr. Gutleber:

Enclosed are the results of analyses performed on sediment samples collected from five sites within the harbor at Harbor Beach, Michigan, by WAPORA, Inc. on March 12, 1978. The sampling and analyses were conducted according to Purchase Order DACW35-78-M-0424, dated March 9, 1978.

Several attachments are included with this letter. ATTACHMENT 1 is a map showing the sampling sites. ATTACHMENT 2 is a record of water depth and pH, and lengths of the core samples taken at each site. ATTACHMENT 3 reports the particle size composition of the sediments. ATTACHMENT 4 is the bulk sediment chemistry, excluding chlorinated compounds. ATTACHMENT 5 reports concentrations of chlorinated compounds in the sediment. ATTACHMENT 6 reports the elutriate results, excluding chlorinated compounds. ATTACHMENT 7 reports concentrations of chlorinated compounds in the elutriate.

Note that ATTACHMENTS 1 and 2 show Sites HBA and HBB. These sites were not in the original specifications for this study. Note also that there is no data from Sites HB4, HB5, and HB10. Site HB10 was in open water with no ice and was, therefore, inaccessible. Sites HB4 and HB5 were sampled but no sediments could be obtained: Site HB4 had 22 feet of water overlying the sediment (the navigation charts show 19 feet of water) and the sediments at that site were approximately 2 feet thick over hard packed sand or shale. The sediments were very unconsolidated and would not remain in the coring device. Site HB5 was in 25 feet of water over the same hard packed sand-shale material that was observed at Site HB4. The sand-shale substrate appeared to be bed rock or lake bottom material. The coring device consisted of 2 inch I.D. black steel pipe with plastic liners and a brass cutting bit. This device would not penetrate the sand-shale substrate when driven with a 10-pound sledge.

Sites HBA and HBB were sampled at WAPORA's discretion and approved by you via phone conversation on March 13, 1978. Notes on the analyses, including methods, are as follows:

Water and elutriate analyses were done by procedures described in "Standard Methods for the Examination of Water and Wastewater," 14th ed., 1975, and "Manual of Methods for Chemical Analysis of Water and Waste," U.S. EPA, 1976.

Sediments were analysed by procedures described in "Chemistry Laboratory Manual, Bottom Sediments Compiled by Great Lakes Region Committee on Analytical Methods," F.D. Fuller, 1969.

Elutriate tests were conducted as described in "Discussion of Regulatory Criteria for Ocean Disposal of Dredged Materials: Elutriate Test Rational and Implementation Guidelines," Keeley and Engler, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss., 1974 misc. paper D-74-14.

The chlorinated compounds were analyzed using gas chromatography with electron capture detection. The same is true for the determination of the chlorinated herbicides after conversion of those compounds to their corresponding methyl esters. The phosphorus compounds were also analyzed by gas chromatography but with an alkali flame ionization detector which is sensitive to phosphorus. The following results were obtained:

1. There was no detectable level of phosphorus compounds in any of the samples. For calibration, and to establish that the system and detector are properly functioning, a 4-component mixture of phosphorus pesticides was used.

2. There was no evidence in any of the samples for presence of the chlorophenoxy herbicides. A 3-component standard mixture containing the specific components in question is used for calibration for this measurement.

3. The remaining chlorinated compounds were not detected in the sediment samples. In the water samples, probably because of the available lower limits of detection, one component was found in each sample which, by retention time, was the same in each sample. It did not correspond to any of the components of our standard mixture and we have computed the quantity represented by the signal detected on the basis of equivalence to the signal per unit weight of DDT (See ATTACHMENT 7, last line).

4. Standards for PBBs, Demeton, Endosulfan and Mirex were not run. There was no signal in the chromatogram where these compounds are normally eluted.

The extracts from the water samples for the chlorinated compounds, which were measured directly, resulted in a 100-fold concentration from the original sample. The extracts from the sediment samples for the same measures resulted only in a 2-fold concentration. Therefore, the sensitivity limits relative to the original samples are approximately 50 times higher for the sediment samples than for the water samples. The same ratio holds for the chlorophenoxy herbicides analyses, except that the lower limits in both cases are approximately 10 times higher because the subsequent conversion to methyl ester results in further dilution.

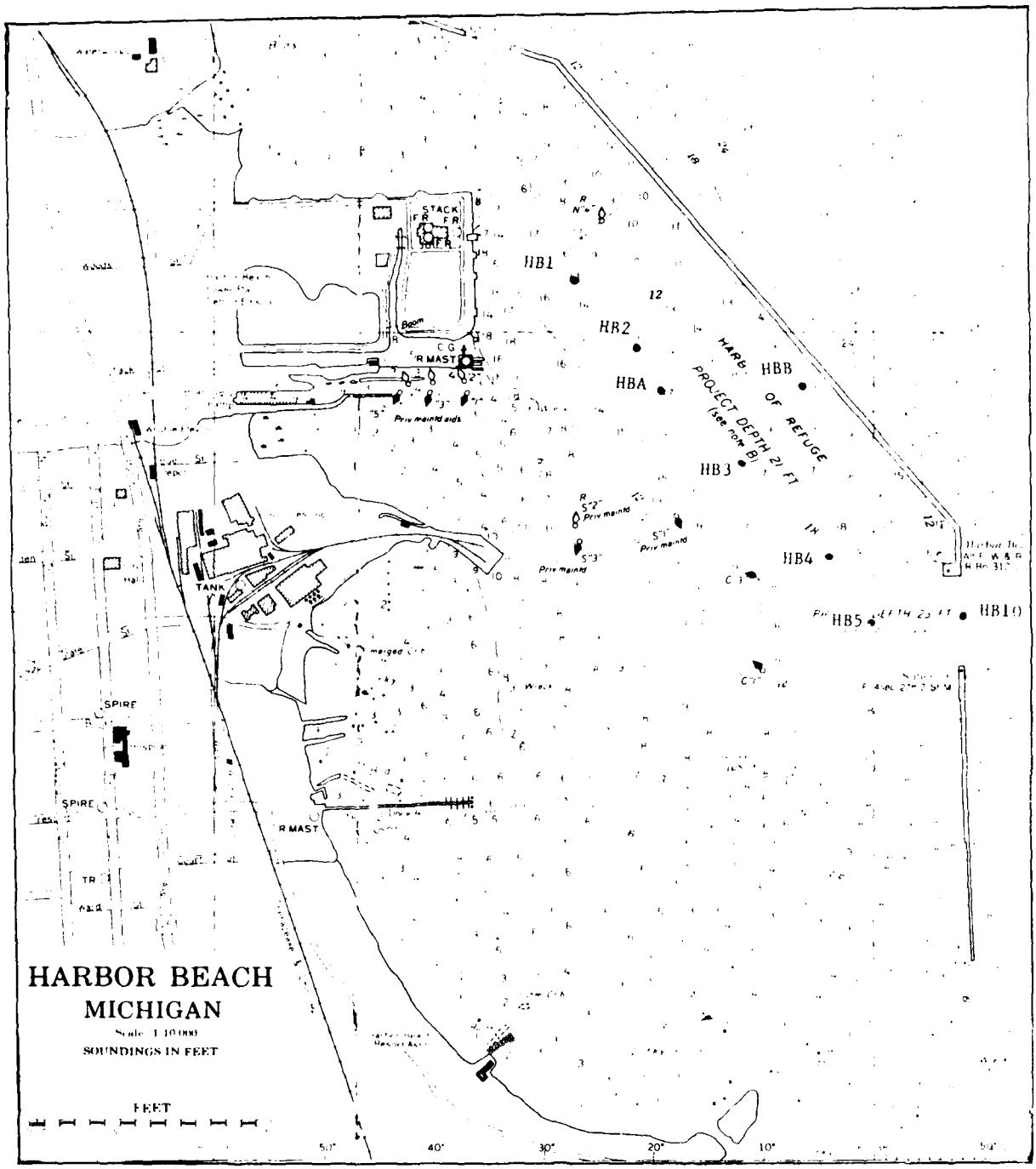
Finally, the analysis for phosphate compounds gave a 10-fold concentration of the original water sample and only a 2-fold increase in concentration from the sediment samples. Therefore, there was a 5-fold difference in lower detectable limits for the two types of samples. Differences in lower detectable limits also result in the chlorinated compounds from the differences in fundamental response per unit weight and from the fact that certain materials are mixtures; thus any one component may be detectable at the expressed lower limit, though the mixture will necessarily require a greater level to be detectable and recognizable. Mixtures such as this are the PCBs, Toxaphene, and chlordane.

If you have any questions concerning these data, please feel free to contact me. I will answer questions regarding the collection of the samples and will direct questions concerning the analytical results to Dr. Thomas Roginski, Lab Director, or Mr. Calvin Hoskins, both of WAPORA, Inc.

Sincerely,

Frank J. Horvath

Frank J. Horvath
Technical Assistant
to the Vice President



ATTACHMENT 1 - Map showing location of sites where sediments were sampled on March 12, 1978.

ATTACHMENT 2 - Depth of water (water + ice) and length of core samples taken at five sites in the harbor at Harbor Beach, Michigan, on March 12, 1978. All measurements are in feet.

Site	Water Depth	Water pH	Length of Core
HB1	15 feet	6.3	5.5 feet
HB2	17	4.5	4.0
HB3	20	6.3	5.5
HB4	22	5.4	No sample; "ooze" sediment 2 feet deep over hard packed sand
HB5	25	5.2	No sample; sediment less than 6 inches deep over hard packed sand
HB10	No measurements -- open water, no ice		
HBA	17	6.3	6
HBB	15	6.3	8

ATTACHMENT 3 - Particle size composition of sediments collected from Harbor Beach, Michigan, on March 12, 1978. Data are presented as percent weight retained or passed by the sieve series.

Site	*Sieve Opening (Microns)				
	2000	500	125	63	Passed
HB1	0.00	0.09	9.52	22.87	67.52
HB2	0.00	0.15	8.64	23.46	67.75
HB3	0.00	0.08	4.50	21.94	73.48
HBA	0.00	0.09	4.39	21.70	73.82
HBB	0.00	0.08	6.65	22.68	70.59

* Corresponds to:

Size Range (Microns)	U.S. Standard Sieve No	Classification
<63	pass through 230	silt and clay
63 - 124	retained by 230	very fine sand
125 - 240	retained by 120	fine sand
500 - 2000	retained by 35	coarse sand
>2000	retained by 10	gravel

Samples dried at 103°C. Weighed samples dispersed with dilute sodium metaphosphate and wet screened through a nest of U.S. Standard Testing Sieves (ASTM E-11 Specification), and dried at 103°C, then reweighed for fraction retained by each sieve.

ATTACHMENT 4 - Results of sediment chemistry (excluding ~~chlorinated~~ organic compounds) analyses of samples from Harbor Beach, Michigan, collected March 12, 1978. Data are reported as mg/kg or percent dry basis. Samples were dried at 103°C.

Parameter	Site				
	HB1	HB2	HB3	HBA	HBB
Total Solids (%)	44.13	45.29	43.83	44.62	46.75
Total Volative Solids (%)	7.50	7.34	6.38	5.75	7.20
Chemical Oxygen Demand (mg/kg)	90,400	86,200	69,000	70,700	78,100
Ammonia - Nitrogen (mg/kg)	630	690	340	510	670
Total Kjeldahl Nitrogen (mg/kg)	4,030	3,880	2,600	3,050	3,410
pH (Laboratory)	6.85	6.70	6.80	6.80	6.75
Oil and Grease (mg/kg)	540	650	560	450	230
Total Phosphorus (mg/kg)	710	690	660	630	690
Total Arsenic (mg/kg)	9	9	10	9	10
Total Mercury (mg/kg)	0.13	<0.10	0.10	<0.10	<0.10
Total Chromium (mg/kg)	20	17	19	18	21
Total Copper (mg/kg)	26	26	28	26	26
Total Iron (mg/kg)	28,600	26,900	25,900	25,600	28,000
Total Manganese (mg/kg)	430	440	330	360	390
Total Nickel (mg/kg)	33	32	31	31	35
Total Lead (mg/kg)	36	39	38	36	42
Total Zinc (mg/kg)	110	105	110	100	105

ATTACHMENT 5 - Results of sediment chemistry analyses for ~~chlorinated~~ organic compounds on samples from Harbor Beach, Michigan, collected on March 12, 1978. ND = below detection level. All data reported as µg/kg

Parameter	Detection Level (µg/kg	Site HB1	HB2	HB3	HBA	HBB
PCB	50	ND	ND	ND	ND	ND
PBB	50	ND	ND	ND	ND	ND
Aldrin/Dieldrin	10	ND	ND	ND	ND	ND
Chlordane	50	ND	ND	ND	ND	ND
Chlorophenoxy Herbicides						
2,4-D	200	ND	ND	ND	ND	ND
2,4,5-T	50	ND	ND	ND	ND	ND
2,4,5-TP Silvex	50	ND	ND	ND	ND	ND
DDT	10	ND	ND	ND	ND	ND
Demeton	10	ND	ND	ND	ND	ND
Endosulpan	10	ND	ND	ND	ND	ND
Endrin	10	ND	ND	ND	ND	ND
Guthion	10	ND	ND	ND	ND	ND
Heptachlor	10	ND	ND	ND	ND	ND
Lindane	10	ND	ND	ND	ND	ND
Malathion	10	ND	ND	ND	ND	ND
Methoxychlor	50	ND	ND	ND	ND	ND
Mirex	50	ND	ND	ND	ND	ND
Parathion	10	ND	ND	ND	ND	ND
Toxaphene	50	ND	ND	ND	ND	ND

ATTACHMENT 6 - Results of sediment elutriate chemistry analyses (excluding ~~chlorinated~~ organic compounds) performed on samples collected on March 12, 1978, from Harbor Beach, Michigan. Background levels are those in filtered water from Site HB3.

Parameter	Background	Site				
	H_2O	HB1	HB2	HB3	HBA	HBB
Total Solids (mg/ℓ)	119	171	177	165	163	162
Total Volatile Solids (mg/ℓ)	45	64	52	61	54	64
Chemical Oxygen Demand (mg/ℓ)	13	42	42	30	33	42
Ammonia - Nitrogen (mg/ℓ)	0.03	48	50	17	27	40
Total Kjeldahl Nitrogen (mg/ℓ)	0.07	49	51	18	28	41
pH (Laboratory)	8.00	7.90	7.90	7.95	8.00	7.65
Oil and Grease (mg/ℓ)	<5	<5	<5	<5	<5	<5
Total phosphorus (mg/ℓ)	0.01	0.05	0.05	0.04	0.03	0.05
Total Coliform, Counts/100ml	0*	-	-	-	-	-
Fecal Coliform, Counts/100ml	0*	-	-	-	-	-
Total Arsenic (µg/ℓ)	<10	<10	<10	<10	<10	<10
Total Mercury (µg/ℓ)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total Chromium (µg/ℓ)	7	7	7	8	8	7
Total Copper (µg/ℓ)	<5	<5	<5	<5	<5	<5
Total Iron (µg/ℓ)		61	33	188	25	33
Total Manganese (µg/ℓ)	<8	86	125	72	87	72
Total Nickel (µg/ℓ)	<10	<10	<10	<10	<10	<10
Total Lead (µg/ℓ)	<20	<20	<20	<20	<20	<20
Total Zinc (µg/ℓ)	6	15	9	7	7	7

*Determined on Unfiltered Sample

ATTACHMENT 7 - Results of sediment elutriate chemistry analyses for organic compounds performed on samples collected on March 12, 1978, from Harbor Beach, Michigan. ND = below detection level. All data are reported as µg/ℓ. Background levels are those in filtered water from Site HB3.

Parameter	Detection Level (µg/ℓ)	Background H$_2$O	Site HB1	HB2	HB3	HBA	HBB
PCB	1.0	ND	ND	ND	ND	ND	ND
PBB	1.0	ND	ND	ND	ND	ND	ND
Aldrin/Dieldrin	0.1	ND	ND	ND	ND	ND	ND
Chlordane	1.0	ND	ND	ND	ND	ND	ND
Chlorophenoxy Herbicides							
2,4-D	5.0	ND	ND	ND	ND	ND	ND
2,4,5-T	1.0	ND	ND	ND	ND	ND	ND
2,4,5-TP Silvex	1.0	ND	ND	ND	ND	ND	ND
DDT	0.1	ND	ND	ND	ND	ND	ND
Demeton	2.0	ND	ND	ND	ND	ND	ND
Endosulpan	0.1	ND	ND	ND	ND	ND	ND
Endrin	0.1	ND	ND	ND	ND	ND	ND
Guthion	2.0	ND	ND	ND	ND	ND	ND
Heptachlor	0.1	ND	ND	ND	ND	ND	ND
Lindane	0.1	ND	ND	ND	ND	ND	ND
Malathion	2.0	ND	ND	ND	ND	ND	ND
Methoxychlor	1.0	ND	ND	ND	ND	ND	ND
Mirex	0.5	ND	ND	ND	ND	ND	ND
Parathion	2.0	ND	ND	ND	ND	ND	ND
Toxaphene	1.0	ND	ND	ND	ND	ND	ND
µg/ℓ as DDT	-	0.1	0.2	0.2	0.1	0.1	0.1

HARBOR BEACH HARBOR MICHIGAN

SAMPLED:	June 4, 1974
BY:	U.S. Environmental Protection Agency Region V Michigan-Ohio District Office 21929 Lorain Road Fairview Park, Ohio 44126
ANALYSIS BY:	Region V Central Regional Laboratory 1819 West Pershing Road Chicago, Illinois 60609
REPORT AUTHOR:	B. L. Burge Michigan-Ohio District Office Fairview Park, Ohio 44126
HARBOR LOCATION:	Harbor Beach Harbor is located at Harbor Beach Michigan. Harbor Beach is approximately 60 miles north of Port Huron, Michigan on the west shore of Lake Huron.
ANALYSIS PERFORMED FOR:	Harbor Sediment Sampling Program

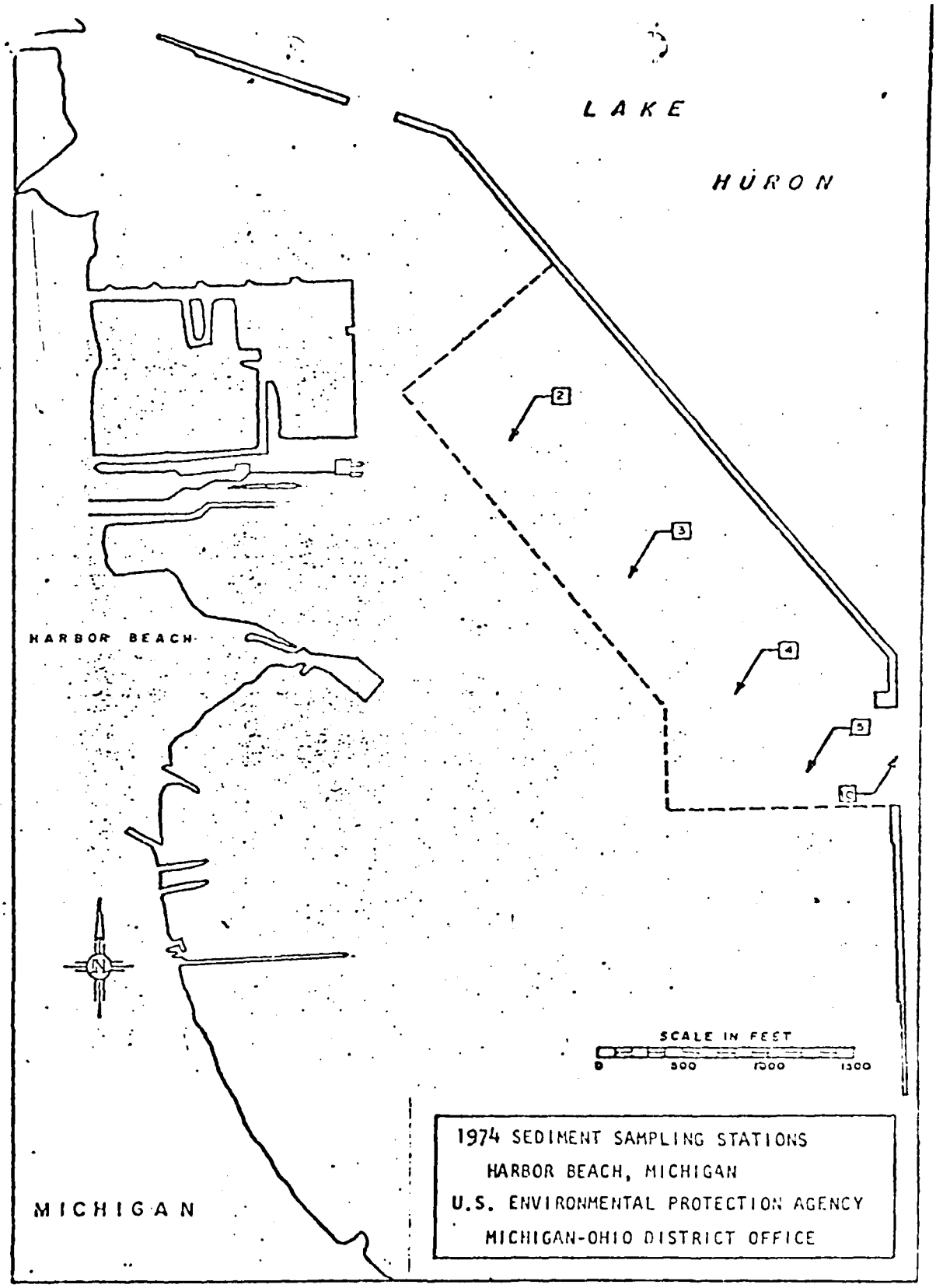
FIELD REPORT

HARBOR: Harbor Beach

STATE: Michigan

SAMPLED: June 4, 1974

SAMPLE & STATION NO.			
74-9589 HB-10	Center of harbor entrance - between N & S breakwall	30'	Ekman grab, sediment dark gray, sludgeworms, leaves, coal, gravel
74-9590 HB-5	600' S.W. of end of North breakwall at harbor entrance	30'	Ekman grab, sediment dark grey & brown, leaves, sludgeworms, clay, stones
74-9591 HB-4	800' S.W. of North breakwall 800' W. of end of N. breakwall	25'	Ekman grab, sediment dark grey, mud, silt, sludgeworms, clay
74-9592 HB-3	800' S.W. of N. breakwall 1600' N.W. of end of N. breakwall	25'	Ekman grab, sediment dark grey, sludgeworms, leaves, mud, silt.
74-9593 HB-2	850' S.W. of N. breakwall 2600' N.W. of end of North breakwall	19	Ekman grab, sediment dark grey wi brown overlay, silt, leaves


LAKE
HURON
HARBOR BEACH
MICHIGAN
2
3
4
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N
SCALE IN FEET
0
500
1000
1500
1974 SEDIMENT SAMPLING STATIONS
HARBOR BEACH, MICHIGAN
U.S. ENVIRONMENTAL PROTECTION AGENCY
MICHIGAN-OHIO DISTRICT OFFICE

SEDIMENT EVALUATION

HARBOR: Harbor Beach

STATE: Michigan

SAMPLED: June 4, 1974

EVALUATING PARAMETER	MAX. ACCEPT. VALUES %	VALUES AT EACH STATION AS A % OF DRY WT. HB-10	HB-5	HB-4	HB-3	HB-2
Volatile Solids	6.0	6.19	5.33	6.34	7.98	7.02
Chemical Oxy. Demand	5.0	6.4	3.6	5.7	8.0	7.4
Total Kjel. Nitrogen	0.10	0.26	0.17	0.24	0.31	0.27
Oil-grease	0.15	0.098	0.060	0.055	0.110	0.100
Mercury	0.0001	<0.00002	<0.00002	<0.00003	<0.00003	<0.00003
Lead	0.005	<0.0015	<0.0015	<0.0025	<0.0015	<0.0015
Zinc	0.005	0.0120	0.0110	0.0094	0.0120	0.0110
Manganese	None Available	0.0360	0.0290	0.0310	0.0410	0.0370
Nickel	"	0.0230	0.0200	0.0180	0.0280	0.0260
Total Phosphorus	"	0.045	0.045	0.042	0.0560	0.0520
Phenolics	"	----------N O T	R U N----------			
Arsenic	"	0.0002	0.0008	0.0005	0.0008	0.0007
Barium	"	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060
Cadmium	"	0.00081	0.00071	0.00076	0.00086	0.00088
Chromium	"	0.0049	0.0051	0.0040	0.0046	0.0037
Cobalt	"	0.0035	0.0038	0.0030	0.0040	0.0034
Copper	"	0.0036	0.0024	0.0017	0.0016	0.0020
Iron	"	2.5	3.1	2.3	2.7	2.4

HARBOR BEACH MACROINVERTEBRATES

6/4/74

DIPTERA	HB-2	HB-3	HB-4	HB-5	HB-10
Procladius sp.	16	4		4	
Chironomus sp.	56	36	52	20	96
Tanytarsus sp.	56	32	36	62	64
Tibelos sp.				20	24
Cryptochironomus sp.				4	
Harnischia sp.				2	
EPHEMEROPTERA					
Caenis sp.				2	
OLIGOCHAETA					
Limnodrilus sp.	224	656	248	104	424
Tubifex sp.	16	44	12		8
AMPHIPODA					
ammarus fasciatus				2	

GUIDELINES FOR THE POLLUTIONAL CLASSIFICATION OF GREAT LAKES HARBOR SEDIMENTS

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION V

CHICAGO, ILLINOIS

April, 1977

Guidelines for the evaluation of Great Lakes harbor sediments, based on bulk sediment analysis, have been developed by Region V of the U.S. Environmental Protection Agency. These guidelines, developed under the pressure of the need to make immediate decisions regarding the disposal of dredged material, have not been adequately related to the impact of the sediments on the lakes and are considered interim guidelines until more scientifically sound guidelines are developed.

The guidelines are based on the following facts and assumptions:

1. Sediments that have been severely altered by the activities of man are most likely to have adverse environmental impacts.

2. The variability of the sampling and analytical techniques is such that the assessment of any sample must be based on all factors and not on any single parameter with the exception of mercury and polychlorinated biphenyls (PCB's).

3. Due to the documented bioaccumulation of mercury and PBC's, rigid limitations are used which override all other considerations.

Sediments are classified as heavily polluted, moderately polluted, or nonpolluted by evaluating each parameter measured against the scales shown below. The overall classification of the sample is based on the most predominant classification of the individual parameters. Additional factors such as elutriate test results, source of contamination particle size distribution, benthic macroinvertebrate populations, color, and odor are also considered. These factors are interrelated in a complex manner and their interpretation is necessarily showewhat subjective.

The following ranges used to classify sediments from Great Lakes harbors are based on compilations of data from over 100 different harbors since 1967.

	NONPOLLUTED	MODERATELY POLLUTED	HEAVILY POLLUTED
Volatile Solids (%)	<5	5 - 8	>8
COD (mg/kg dry weight)	<40,000	40,000-80,000	>80,000
TKN " " "	<1,000	1,000-2,000	>2,000
Oil and Grease (Hexane Solubles) (mg/kg dry weight)	<1,000	1,000-2,000	>2,000
Lead (mg/kg dry weight)	<40	40-60	>60
Zinc " " "	<90	90-200	>200

The following supplementary ranges used to classify sediments from Great Lakes harbors have been developed to the point where they are usable but are still subject to modification by the addition of new data. These ranges are based on 260 samples from 34 harbors sampled during 1974 and 1975.

	NONPOLLUTED	MODERATELY POLLUTED	HEAVILY POLLUTED
Ammonia (mg/kg dry weight)	<75	75-200	>200
Cyanide " " "	<0.10	0.10-0.25	>0.25
Phosphorus " " "	<420	420-650	>650
Iron " " "	<17,000	17,000-25,000	>25,000
Nickel " " "	<20	20-50	>50
Manganese " " "	<300	300-500	>500
Arsenic " " "	<3	3-8	>8
Cadmium " " "	*	*	>6
Chromium " " "	<25	25-75	>75
Barium " " "	<20	20-60	>60
Copper " " "	<25	25-50	>50

*Lower limits not established

The guidelines stated below for mercury and PCB's are based upon the best available information and are subject to revision as new information becomes available.

Methylation of mercury at levels $\geq$ mg/kg has been documented (1,2). Methyl mercury is directly available for bioaccumulation in the food chain.

Elevated PCB levels in large fish have been found in all of the Great Lakes. The accumulation pathways are not well understood. However, bioaccumulation of PCB's at levels $\geq$ 10 mg/kg in fathead minnows has been documented (3).

Because of the known bioaccumulation of these toxic compounds, a rigid limitation is used. If the guideline values are exceeded, the sediments are classified as polluted and unacceptable for open lake disposal no matter what the other data indicate.

	POLLUTED
Mercury	$\geq$ 1 mg/kg dry weight
Total PCB's	$\geq$ 10 mg/kg dry weight

The pollutional classification of sediments with total PCB concentrations between 1.0 mg/kg and 10.0 mg/kg dry weight will be determined on a case-by-case basis.

a. Elutriate test results.

The elutriate test was designed to simulate the dredging and disposal process. In the test, sediment and dredging site water are mixed in the ratio of 1:4 by volume. The mixture is shaken for 30 minutes, allowed to settle for 1 hour, centrifuged, and filtered through a 0.45 μ filter. The filtered water (elutriate water) is then chemically analyzed.

A sample of the dredging site water used in the elutriate test is filtered through a 0.45 μ filter and chemically analyzed.

A comparison of the elutriate water with the filtered dredging site water for like constituents indicates whether a constituent was or was not released in the test.

The value of elutriate test results are limited for overall pollutional classification because they reflect only immediate release to the water column under aerobic and near neutral pH conditions. However, elutriate test results can be used to confirm releases of toxic materials and to influence decisions where bulk sediment results are marginal between two classifications. If there is release or non-release, particularly of a more toxic constituent, the elutriate test results can shift the classification toward the more polluted or the less polluted range, respectively.

b. Source of sediment contamination.

In many cases the sources of sediment contamination are readily apparent. Sediments reflect the inputs of paper mills, steel mills, sewage discharges, and heavy industry very faithfully. Many sediments may have moderate or high concentrations of TKN, COD, and volatile solids yet exhibit no evidence of man made pollution. This usually occurs when drainage from a swampy area reaches the channel or harbor, or when the project itself is located in a low lying wetland area. Pollution in these projects may be considered natural and some leeway may be given in the range values for TKN, COD, and volatile solids provided that toxic materials are not also present.

c. Field observations.

Experience has shown that field observations are a most reliable indicator of sediment condition. Important factors are color, texture, odor, presence of detritus, and presence of oily material.

Color. A general guideline is the lighter the color the cleaner the sediment. There are exceptions to this rule when natural deposits have a darker color. These conditions are usually apparent to the sediment sampler during the survey.

Texture. A general rule is the finer the material the more polluted it is. Sands and gravels usually have low concentrations of pollutants while silts usually have higher concentrations. Silts are frequently carried from polluted upstream areas, whereas, sand usually comes from lateral drift along the shore of the lake. Once again, this general rule can have exceptions and it must be applied with care.

Odor. This is the odor noted by the sampler when the sample is collected. These odors can vary widely with temperature and observer and must be used carefully. Lack of odor, a beach odor, or a fishy odor tends to denote cleaner samples.

Detritus. Detritus may cause higher values for the organic parameters COD, TKN, and volatile solids. It usually denotes pollution from natural sources. Note: The determination of the "naturalness" of a sediment depends upon the establishment of a natural organic source and a lack of man made pollution sources with low values for metals and oil and grease. The presence of detritus is not decisive in itself.

Oily material. This almost always comes from industry or shipping activities. Samples showing visible oil are usually highly contaminated. If chemical results are marginal, a notation of oil is grounds for declaring the sediment to be polluted.

d. Benthos.

Classical biological evaluation of benthos is not applicable to harbor or channel sediments because these areas very seldom support a well balanced population. Very high concentrations of tolerant organisms indicate organic contamination but do not necessarily preclude open lake disposal of the sediments. A moderate concentration of oligochaetes or other tolerant organisms frequently characterizes an acceptable sample. The worst case exists when there is a complete lack or very limited number of organisms. This may indicate a toxic condition.

In addition, biological results must be interpreted in light of the habitat provided in the harbor or channel. Drifting sand can be a very harsh habitat which may support only a few organisms. Silty material, on the other hand, usually provides a good habitat for sludgeworms, leeches, fingernail clams, and perhaps, amphipods. Material that is frequently disturbed by ship's propellers provides a poor habitat.

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1. Jensen, S., and Jernelov, A., "Biological Methylation of Mercury in Aquatic Organisms," Nature, 223 August 16, 1969 pp 753-754.

2. Magnuson, J.J. Forbes, A., and Hall, R., "Final Report - An Assessment of the Environmental Effects of Dredged Material Disposal in Lake Superior - Volume 3: Biological Studies," Marine Studies Center, University of Wisconsin, Madison, March, 1976.

3. Halter, M.T., and Johnson, H.E., "A Model System to Study the Release of PCB from Hydrosoils and Subsequent Accumulation by Fish," presented to American Society for Testing and Materials, Symposium on Aquatic Toxicology and Hazard Evaluation," October 25-26, 1976, Memphis, Tennessee

DEPARTMENT OF NATURAL RESOURCES

WATER RESOURCES COMMISSION

GENERAL RULES

Filed with Secretary of State, November 27, 1973

These rules take effect 15 days after filing with the Secretary of State

(By authority conferred on the water resources commission by sections 2 and 5 of Act No. 245 of the Public Acts of 1929, as amended, being sections 323.2 and 323.5 of the Michigan Compiled Laws.)

Part 4. Water Quality Standards, is added to the General Rules of the commission to read as follows:

PART 4. WATER QUALITY STANDARDS

R 323.1041. Purpose

Rule 1041. It is the purpose of the water quality standards as prescribed by these rules to establish water quality requirements applicable to the Great Lakes, their connecting waterways and all other surface waters of the state, which shall protect the public health and welfare, enhance and maintain the quality of water, serve the purposes of United States Public Law 92-500 and the commission act; and which shall protect the quality of waters for recreational purposes, public and industrial water supplies, agriculture uses, navigation and propagation of fish, other aquatic life and wildlife.

R 323.1043. Definitions A to N.

Rule 1043. As used in this part:

(a) "Agricultural water use" means a use of water for agricultural purposes, including but not limited to livestock watering, irrigation and crop spraying.

(b) "Application factor" means a numerical factor applied to the TL_m, or concentration producing other effect end points to provide the concentration of a toxic substance that would be safe for test organisms in the waters of the state.

(c) "Best practicable waste treatment technology for control of total phosphorus" means chemical-physical or chemical-physical-biological treatment processes, including but not limited to treatment with aluminum salts, iron salts or lime in conjunction with appropriate coagulant chemicals, settling or filtration or both, with operation and management of the treatment facilities and the process to achieve optimum phosphorus removal rates, or equivalent treatment.

(d) "Anadromous salmonids" means those trout and salmon which ascend streams to spawn.

(e) "Coldwater fish" means those fish species whose populations thrive in relatively cold water, including but not limited to trout, salmon, whitefish and cisco.

(f) "Connecting waterways" means the St. Marys river, Keweenaw waterway, Detroit river, St. Clair river and lake St. Clair.

(g) "Designated use" means a use of the waters of the state as established by these rules, including but not limited to industrial, agricultural and public water supply; recreation; fish, other aquatic life and wildlife; and navigation.

(h) "Dissolved oxygen" means the amount of oxygen dissolved in water, commonly expressed as a concentration in terms of milligrams per liter.

(i) "Dissolved solids" means the amount of materials dissolved in water commonly expressed as a concentration in terms of milligrams per liter.

(j) "Effluent" means a wastewater discharged from a point source to the waters of the state.

(k) "Fecal coliform" means a type of coliform bacteria found in the intestinal tract of humans and other warm-blooded animals.

(l) "Fish, other aquatic life and wildlife use" means the use of the waters of the state by fish, other aquatic life and wildlife for any life history stage or activity.

(m) "Industrial water supply" means a water source not protected for public water supply and intended for use in commercial or industrial applications and non-contact food processing.

(n) "Mixing zone" means a region of a water body which receives a wastewater discharge of a different quality than the receiving waters, and within which the water quality standards as prescribed by these rules do not apply.

(o) "Natural water temperature" means the temperature of a body of water without an influence from an artificial source, or a temperature as otherwise determined by the commission.

R 323.1044. Definitions P to W

Rule 1044. As used in this part:

(a) "Palatability" means the state of being agreeable or acceptable to the senses of sight, taste or smell.

(b) "Plant nutrients" means those chemicals, including but not limited to nitrogen and phosphorus, necessary for the growth and reproduction of aquatic rooted, attached and floating plants, fungi or bacteria.

(c) "Point source" means a discernible, confined and discrete conveyance, from which wastewater is or may be discharged to the waters of the state including but not limited to a pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, concentrated animal feeding operation or vessel or other floating craft.

(d) "Public water supply" means a surface raw water source which, after conventional treatment, will provide a safe, clear, potable and aesthetically pleasing water for uses which include but are not limited to human consumption, food processing and cooking and as a liquid ingredient in foods and beverages.

(e) "Raw water" means the waters of the state prior to any treatment.

(f) "Receiving waters" means the waters of the state into which an effluent is or may be discharged.

(g) "Sanitary sewage" means treated or untreated wastewaters which contain human metabolic and domestic wastes.

(h) "Standard" means a definite numerical value or narrative statement promulgated by the commission to enhance or maintain water quality to provide for and fully protect a designated use of the waters of the state.

(i) "Suspended solids" means the amount of material suspended in water, commonly expressed as a concentration in terms of milligrams per liter.

(j) "TL_m" means median tolerance limit which is the concentration of a test material in a suitable diluent at which 50% of the exposed organisms survive for a specified period of exposure.

(k) "Total body contact recreation" means an activity where the human body may come into direct contact with water to the point of complete submergence, including but not limited to activities such as swimming, water skiing and skin diving.

(l) "Toxic substance" means a substance of unnatural origin, except heat, in concentrations or combinations which are or may become harmful to plant or animal life.

(m) "Warmwater fish" means those fish species whose populations thrive in relatively warm water, including but not limited to bass, pike, walleye and panfish.

(n) "Wastewater" means liquid waste resulting from commercial, municipal and domestic operations and industrial processes, including but not limited to cooling and condensing waters, sanitary sewage and industrial waste.

(o) "Waters of the state" means the Great Lakes, their connecting waterways, all inland lakes, rivers, streams, impoundments, open drains and other surface watercourses within the confines of the state, except drainage ways and ponds used solely for wastewater conveyance, treatment or control.

R 323.1050. Suspended solids.

Rule 1050. All waters of the state shall contain no unnatural turbidity, color, oil films, floating solids, foams, settleable solids or deposits in quantities which are or may become injurious to any designated use.

R. 323.1051. Dissolved solids.

Rule 1051. (1) The addition of any dissolved solids shall not exceed concentrations which are or may become injurious to any designated use. Point sources containing dissolved solids shall be considered by the commission on a case-by-case basis and increases of dissolved solids in the waters of the state shall be limited through the application of best practicable control technology currently available as prescribed by the administrator of the United States environmental protection agency pursuant to section 304 (b) of United States Public Law 92-500, except that in no instance shall total dissolved solids in the waters of the state exceed a concentration of 500 milligrams per liter as a monthly average nor more than 750 milligrams per liter at any time, as a result of controllable point sources.

(2) In addition to the standards prescribed by subrule (1), waters of the state used for public water supply shall, at the point of water intake, not exceed the permissible inorganic and organic chemicals criteria for raw public water supply in "Report of the National Technical Advisory Committee to the Secretary of the Interior, Water Quality Criteria, 1968", except chlorides. For the Great Lakes and connecting waters, chlorides shall, at the point of water intake, not exceed 50 milligrams per liter as a monthly average. For all other waters of the state, chlorides shall, at the point of water intake, not exceed 125 milligrams per liter as a monthly average.

R 323.1053. Hydrogen ion concentration.

Rule 1053. The hydrogen ion concentration expressed as pH shall be maintained within the range of 6.5 to 8.8 in all waters of the state except as otherwise prescribed by rule 1080. Any artificially induced variation in the natural pH shall remain within this range and shall not exceed 0.5 units of pH.

R 323.1055. Taste and odor producing substances.

Rule 1055. The waters of the state shall contain no unnatural substances in concentrations which are or may become injurious to their use for public, industrial or agricultural water supply, or in concentrations which lower the palatability of fish as measured by test procedures acceptable to the commission.

R 323.1057. Toxic substances

Rule 1057. (1) Toxicity of undefined toxic substances not specifically included in subrules (2) and (3) shall be determined by development of 96 hour TL_m's or other appropriate effect end points obtained by continuous-flow or in situ bioassays using suitable test organisms. Concentrations of undefined toxic substances in the waters of the state shall not exceed safe concentrations as determined by applying an application factor, based on knowledge of the behavior of the toxic substances and the organisms to be protected in the environment, to the TL_m or other appropriate effect end point.

(2) For all waters of the state, unless on the basis of recent information a more restrictive limitation is required to protect a designated use, concentrations of defined toxic substances, including heavy metals, shall be limited by application of the toxic substances recommendations contained in the chapter on Freshwater Organisms, "Report of the National Technical Advisory Committee to the Secretary of the Interior, Water Quality Criteria, 1968", or by application of any toxic effluent standard, limitation or prohibition promulgated by the administrator of the United States environmental protection agency pursuant to section 307 (a) of the United States Public Law 92-500, whichever is more restrictive.

(3) In addition to the standards prescribed in subrules (1) and (2), waters of the state used for public water supply shall, at the point of water intake, not exceed the permissible inorganic and organic chemicals criteria for raw public water supply in "Report of the National Technical Advisory Committee to the Secretary of the Interior, Water Quality Criteria, 1968", except that chlorides shall be limited to the same extent as prescribed by rule 1051(2).

R 323.1058. Radioactive substances.

Rule 1058. The control and regulation of radioactive substances discharged to the waters of the state shall be in accordance with and subject to the criteria, standards or requirements prescribed by the United States atomic energy commission as set forth in the applicable Code of Federal Regulations, Title 10, Part 20.

R 323.1060. Plant nutrients.

Rule 1060. Nutrients originating from domestic, industrial, municipal or domestic animal sources shall be limited to the extent necessary to prevent stimulation of growths of aquatic rooted, attached and floating plants, fungi or bacteria which are or may become injurious to the designated uses of the

waters of the state. Phosphorus which is or may readily become available as a plant nutrient shall be controlled from point source discharges by the application of methods utilizing best practicable waste treatment technology for control of total phosphorus, with the goal of achieving a monthly average effluent concentration of one milligram per liter as P.

R 323.1062. Fecal coliform.

Rule 1062. (1) Waters of the state protected for total body contact recreation shall contain not more than 200 fecal coliforms per 100 milliliters; and all other waters of the state shall contain not more than 1,000 fecal coliforms per 100 milliliters. These concentrations may be exceeded if due to uncontrollable non-point sources.

(2) Compliance with the fecal coliform standards prescribed by subrule (1) shall be determined on the basis of the geometric average of any series of 5 or more consecutive samples taken over not more than a 30-day period.

R 323.1064. Dissolved oxygen; Great Lakes, connecting waterways and inland streams.

Rule 1064. A minimum of 6 milligrams per liter of dissolved oxygen in all Great Lakes and connecting waterways shall be maintained and, except for inland lakes as prescribed in rule 1065, a minimum of 6 milligrams per liter of dissolved oxygen shall be maintained at all times in all inland streams designated by these rules to be protected for coldwater fish. In all other waters, except for inland lakes as prescribed by rule 1065, a minimum of 5 milligrams per liter of dissolved oxygen shall be maintained as a daily average and no single value shall be less than 4 milligrams per liter in waters naturally capable of supporting warmwater fish.

R 323.1065. Dissolved oxygen; inland lakes.

Rule 1065. (1) The following standards for dissolved oxygen shall apply to inland lakes capable of supporting coldwater fish:

(a) In warmwater inland lakes with little water exchange which are capable of sustaining a cold stratum of well-oxygenated water throughout the summer above a hypolimnion with very little oxygen, a minimum of 6 milligrams per liter of dissolved oxygen shall be maintained throughout the epilimnion and the upper one-third of the thermocline during the entire summer stagnation period. At all other times, the dissovled oxygen concentration shall be maintained at natural levels.

(b) In inland lakes capable of sustaining high oxygen values throughout the hypolimnion during periods of stagnation, dissolved oxygen concentrations greater than 6 milligrams per liter shall be maintained throughout the entire lake.

(c) In inland lakes which serve a principal anadromous fish migration routes, dissolved oxygen concentrations greater than 5 milligrams per liter shall be maintained throughout the epilimnion and the upper one-third of the thermocline in stratified lakes throughout periods of fish migration. In unstratified lakes, dissolved oxygen concentrations greater than 5 milligrams per liter shall be maintained throughout the entire lake during periods of fish migration.

(d) In shallow, unstratified coldwater inland lakes, dissolved oxygen concentrations greater than 6 milligrams per liter shall be maintained throughout the entire lake.

(2) The following standards for dissolved oxygen shall apply to inland lakes capable of supporting warmwater fish.

(a) In warmwater lakes with little water exchange, dissolved oxygen concentrations greater than 5 milligrams per liter shall be maintained throughout the epilimnion and the upper one-third of the thermocline during the entire summer stagnation period. At all other times, dissolved oxygen concentrations shall be maintained at natural levels.

(b) In warmwater lakes with a high rate of water exchange, dissolved oxygen concentrations greater than 5 milligrams per liter shall be maintained throughout the epilimnion and the upper one-third of the thermocline during the summer stagnation period. At all other times, dissolved oxygen concentrations greater than 5 milligrams per liter shall be maintained except in areas where natural oxygen depressions occur.

R 323.1069. Temperature; general considerations.

Rule 1069. (1) In all waters of the state, the points of temperature measurement normally shall be in the surface 1 meter; however, where turbulance, sinking plumes, discharge inertia or other phenomena upset the natural thermal distribution patterns of receiving waters, temperature measurements shall be required to identify the spatial characteristics of the thermal profile.

(2) Monthly maximum termperatures, based on the ninetieth percentile occurrence of natural water temperatures plus the increase allowed at the edge of the mixing zone and in part on long-term physiological needs of fish, may be exceeded for short periods when natural water temperatures exceed the ninetieth percentile occurrence. Temperature increases during these periods may be permitted by the commission, but in all cases shall not be greater than the natural water temperature plus the increase allowed at the edge of the mixing zone.

(3) Natural daily and seasonal temperature fluctuations of the receiving waters shall be preserved.

R 323.1070. Temperature; Great Lakes and connecting waterways.

Rule 1070. (1) The Great Lakes and connecting waterways shall not receive a heat load which would warm the receiving water at the edge of the mixing zone more than 3 degrees Fahrenheit above the existing natural water temperature.

(2) The Great Lakes and connecting waterways shall not receive a heat load which would warm the receiving water at the edge of the mixing zone to temperatures in degrees Fahrenheit higher than the following monthly maximum temperatures:

(a) Lake Michigan north of a line due west from the city of Pentwater:

J	F	M	A	M	J	J	A	S	O	N	D
40	40	40	50	55	70	75	75	75	65	60	45

(b) Lake Michigan south of a line due west from the city of Pentwater:

J	F	M	A	M	J	J	A	S	O	N	D
45	45	45	55	60	70	80	80	80	65	60	50

(c) Lake Superior and the St. Marys River:

J	F	M	A	M	J	J	A	S	O	N	D
38	36	39	46	53	61	71	74	71	61	49	42

(d) Lake Huron north of a line due east from Tawas Point:

J	F	M	A	M	J	J	A	S	O	N	D
40	40	40	50	60	70	75	80	75	65	55	45

(e) Lake Huron south of a line due east from Tawas Point, except Saginaw bay:

J	F	M	A	M	J	J	A	S	O	N	D
40	40	40	55	60	75	80	80	80	65	55	45

(f) Lake Huron, Saginaw bay:

J	F	M	A	M	J	J	A	S	O	N	D
45	45	45	60	70	75	80	85	78	65	55	45

(g) St. Clair river:

J	F	M	A	M	J	J	A	S	O	N	D
40	40	40	50	60	70	75	80	75	65	55	50

(h) Lake St. Clair:

J	F	M	A	M	J	J	A	S	O	N	D
40	40	45	55	70	75	80	83	80	70	55	45

(i) Detroit river:

J	F	M	A	M	J	J	A	S	O	N	D
40	40	45	60	70	75	80	83	80	70	55	45

(j) Lake Erie:

J	F	M	A	M	J	J	A	S	O	N	D
45	45	45	60	70	75	80	85	80	70	60	50

R 323.1072. Temperature: inland lakes, general standards.

Rule 1072. Inland lakes shall not receive a heat load which would:

(a) Increase the temperature of the thermocline or hypolimnion or decrease the volume thereof.

(b) Increase the temperature of the receiving waters at the edge of the mixing zone more than 3 degrees Fahrenheit above the existing natural water temperature.

(c) Increase the temperature of the receiving waters at the edge of the mixing zone to temperatures greater than the following monthly maximum temperatures:

J	F	M	A	M	J	J	A	S	O	N	D
45	45	50	60	70	75	80	85	80	70	60	50

R 323.1073. Temperature; inland lakes, anadromous salmonid migrations.

Rule 1073. Warmwater inland lakes which serve as principal migratory routes for anadromous salmonids shall not receive a heat load during periods of migration at such locations and in a manner which may adversely affect salmonid migration or raise the receiving water temperature at the edge of the mixing zone more than 3 degrees Fahrenheit above the existing natural water temperature.

R 323.1074. Impoundments.

Rule 1074. (1) River and stream standards as prescribed by rule 1075 shall apply to all impoundments.

(2) The commission shall determine, when necessary, whether a body of water shall be considered as an inland lake or an impoundment for the purpose of these rules. This determination shall be made partially on the basis of aquatic life resources to be protected.

R 323.1075. Temperature; rivers and streams.

Rule 1075. (1) Rivers and streams naturally capable of supporting coldwater fish shall not receive a heat load which would:

(a) Increase the temperature of the receiving waters at the edge of the mixing zone more than 2 degrees Fahrenheit above the existing natural water temperature.

(b) Increase the temperature of the receiving waters at the edge of the mixing zone to temperatures greater than the following monthly maximum temperatures:

J	F	M	A	M	J	J	A	S	O	N	D
38	38	43	54	65	68	68	68	63	56	48	40

(2) Rivers and streams naturally capable of supporting warmwater fish shall not receive a heat load which would warm the receiving water at the edge of the mixing zone more than 5 degrees Fahrenheit above the existing natural water temperature.

(3) Rivers and streams naturally capable of supporting warmwater fish shall not receive a heat load which would warm the receiving water at the edge of the mixing zone to temperatures greater than the following monthly maximum temperatures:

(a) Rivers and streams north of a line between Bay City, Midland, Alma and North Muskegon:

J	F	M	A	M	J	J	A	S	O	N	D
38	38	41	56	70	80	83	81	74	64	49	39

(b) Rivers and streams south of a line between Bay City, Midland, Alma and North Muskegon, except the St. Joseph river:

J	F	M	A	M	J	J	A	S	O	N	D
41	40	50	63	76	84	85	85	79	68	55	43

(c) St. Joseph river:

J	F	M	A	M	J	J	A	S	O	N	D
50	50	55	65	75	85	85	85	85	70	60	50

(4) Non-trout rivers and streams that serve as principal migratory routes for anadromous salmonids shall not receive a heat load during periods of migration at such locations and in a manner which may adversely affect salmonid migration or raise the receiving water temperature at the edge of the mixing zone more than 5 degrees Fahrenheit above the existing natural water temperature.

R 323.1080. Special conditions

Rule 1080. To be consistent with the agreement between the United States of America and Canada on Great Lakes water quality effective April 15, 1972, the following conditions shall apply to the Michigan waters of the Great Lakes and their connecting waterways:

(a) Values of pH shall not be outside the range of 6.7 to 8.5.

(b) In Lake Erie, the level of total dissolved solids shall not be greater than 200 milligrams per liter.

(c) Filtrable iron shall not be greater than 0.3 milligrams per liter.

R 323.1082. Mixing zones.

Rule 1082. (1) A mixing zone to achieve a mixture of a point source discharge with the receiving waters shall be considered a region in which organism response to water quality characteristics is time-dependent. Exposure in mixing zones shall not cause an irreversible response which results in deleterious effects to populations of important aquatic life and wildlife. As a minimum restriction the toxic substance 96 hour TL_m for important species of fish or fishfood organisms shall not be exceeded in the mixing zone at any point inhabitable by these organisms, unless it can be demonstrated to the commission that a higher concentration is acceptable. The mixing zone at any transect of a stream shall contain not more than 25% of the cross-sectional area or volume of flow of the stream or both unless it can be demonstrated to the commission that designation of a greater area or volume of streamflow will allow passage of fish and fishfood organisms so that effects on their immediate and future populations are negligible or not measureable. Watercourses or portions thereof which, without one or more point source discharges, would have no flow except during periods of surface runoff may be considered as a mixing zone for a point source discharge. For Lake Michigan, mixing zones shall not exceed a defined area equivalent to that of a circle of radius of 1,000 feet unless the discharger can demonstrate to the commission that the defined area for a thermal discharge is more stringent than necessary to assure the protection and propagation of a balanced indigenous population of aquatic life and wildlife in the receiving water.

(2) All mixing zones established by the commission pursuant to subrule (1) shall be determined on a case-by-case basis.

R 323.1090 Application of water quality standards.

Rule 1090. (1) The water quality standards prescribed by these rules for the various designated uses of the waters of the state apply to receiving

waters and are not to be considered applicable to wastewater effluents. The water quality standards shall not apply within defined mixing zones, except for those standards prescribed in rule 1050 for settleable solids, deposits,, floating solids and oil films.

(2) The accepted design streamflow to which the water quality standards as prescribed by these rules shall apply are those equal to or exceeding the 10-year recurrance of a minimum low flow average of 7-day duration, except where the commission determines that a more restrictive application is necessary to protect a particular designated use.

R 323.1091. Designated use interruption.

Rule 1091. Protection of the waters of the state designated for total body contact recreation by the water quality standards prescribed by these rules may be subject to temporary interruption during or following flood conditions or uncontrollable accidents to a sewer or wastewater treatment system. In the event of such an occurrence, full public notice thereof shall be served by the commission to those affected thereby and immediate corrective action shall be required by the commission.

R 323.1092. Dredging.

Rule 1092. The water quality standards prescribed by these rules shall not apply to dredging or construction activities within water areas where such activities occur or during the periods of time when the after effects of dredging or construction activities degrade water quality within such water areas, if the dredging operations or construction have been authorized by the United States army corps of engineers or the department. The water quality standards shall apply, however, in non-confined water areas utilized for the disposal of spoil from dredging operations, except within spoil disposal sites specifically defined by the United States army corps of engineers or the department.

R 323.1096. Determinations of compliance.

Rule 1096. Analysis of the waters of the state to determine compliance with the water quality standards prescribed by these rules shall be made according to procedures outlined in the current edition of "Standard Methods for the Examination of Water and Wastewater" as published jointly by the American Public Health Association, the American Water Works Association and the Water Pollution Control Federation, or other methods prescribed or approved by the commission and the United States environmental protection agency.

R 323.1097. Chemical applications.

Rule 1097. The application of chemicals for water resource management projects in accordance with and subject to state statutory provisions is not subject to the standards prescribed by these rules, but all projects shall be reviewed and approved by the commission prior to chemical applications.

R 323.1098. Nondegradation and water quality improvement.

Rule 1098. (1) Waters of the state in which the existing water quality is better than the water quality standards prescribed by these rules on the date when the standards become effective, shall not be lowered in quality by

action of the commission unless and until it has been affirmatively demonstrated to the commission that a change in quality will not become injurious to the public health, safety or welfare; or become injurious to domestic, commercial, industrial, agricultural, recreational or other uses which are being made of the waters; or become injurious to livestock, wild animals, birds, aquatic life or plants, or the growth or propagation thereof be prevented or injuriously affected; or whereby the value of fish or game may be destroyed or impaired, and that a lowering in quality will not be unreasonable and against the public interest in view of the existing conditions in any waters of the state.

(2) Waters of the state which do not meet the water quality standards prescribed by these rules shall be improved to meet those standards. Where the water quality of certain waters of the state do not meet the water quality standards as a result of natural causes or conditions, no further reduction of water quality by controllable point and non-point sources shall be permitted.

R 323.1100. Designated uses, general.

Rule 1100. (1) As a minimum, all waters of the state shall be protected for agricultural uses, navigation, industrial water supply, public water supply at the point of water intake, warmwater fish and partial body contact recreation.

(2) All waters of the state designated as trout streams by the director of the department pursuant to section 8 of Act No. 165 of the Public Acts of 1929, as amended, being section 301.8 of the Michigan Compiled Laws, shall be protected for coldwater fish.

(3) All inland lakes designated or managed as trout lakes by the department and the Great Lakes and their connecting waterways shall be protected for coldwater fish.

R 323.1105. Multiple designated uses.

Rule 1105. When a particular portion of the waters of the state is designated for more than 1 use, the most restrictive water quality standards for one or more of those designated uses shall apply to that portion.

R 323.1110. Designated uses, total body contact recreation.

Rule 1110. (1) The following waters of the state, except in mixing zones prescribed by the commission, shall be protected for total body contact recreation:

(a) All Great Lakes and their connecting waterways.

(b) All inland lakes, including but not limited to those connected to the Great Lakes.

(2) The following rivers and streams and their tributaries, except in mixing zones as prescribed by the commission, shall be protected for total body contact recreation:

(a) All rivers and streams located in the Upper Peninsula.

(b) All rivers and streams located north of, but not including, the Grand and Saginaw river basins.

R 323.1115. Designated uses, impoundments and portions of streams.

Rule 1115. (1) The following impoundments and portions of streams shall be protected for total body contact recreational use:

	Name	Water Impounded	County	Location
(a)	Ada Lake	Thornapple River	Kent	From head of Ada Dam, T. 7 N., R. 10 W. Sec. 34 upstream to headwaters of Cascade Lake (48th Street).
(b)	Belleville Lake	Huron River	Wayne	T. 3 S., R. 8 E., Sec. 19 downstream to T. 3 S., R. 8 E., Sec. 24.
(c)	C. S. Mott Lake	Flint River	Genesee	T. 8 N., R. 7 E., Sec. 11, 12, 15, 16, 21.
(d)	Caley Pond	Farmer Creek	Lapeer	T. 6 N., R. 9 E., Sec. 12 and 13.
(e)	Cascade Lake	Thornapple River	Kent	Included in Ada Lake Area
(f)	Fallasberg Dam	Flat River	Kent	T. 7 N., R. 9 W., Sec. 24, 25, 26.
(g)	Ford Lake	Huron River	Washtenaw	T. 3 S., R. 7 E., Sec. 14, 15, 16, 21, 22, 23, 24
(h)	Geddes Pond	Huron River	Washtenaw	T. 2 S., R. 6 E., Sec. 26, 35, 36.
(i)	Grand River	Grand River (not impounded)	Ottawa	Eastmanville T. 7 N., R. 14 W., Sec. 10, downstream to 160th Avenue.
(j)	Grand River	Grand River (not impounded)	Kent	Plainfield Road bridge downstream to lower limits of Comstock Riverside Park, T. 8 N., R. 11 W. Sec. 31.
(k)	Holloway Reservoir	Flint River	Genesee	T. 8 N., R. 8 E., Sec. 1, 2, 11, 12, 13. T. 8 N., R. 9 E., Sec. 7, 8, 17, 18.

R 323.1116. Availability of documents.

Rule 1116. Documents referenced in rules 1057 and 1096 may be obtained at current costs as listed as follows:

(a) "Report of the National Technical Advisory Committee to the Secretary of the Interior, Water Quality Criteria, 1968" may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402, at a cost of $3.00.

(b) "Standard Methods for the Examination of Water and Wastewater" may be obtained from the American Public Health Association, 1015 Eighteenth Street, N.W., Washington, D. C., 20036, at a cost of $35.00.

APPENDIX 3

Miscellaneous Environmental Information
Supplied by the Applicant

Harbor Beach Dredged Spoil
Disposal Facility
The Detroit Edison Company
HLA Project Number 9901,003.14
July 24, 1980

DISCUSSION OF ENVIRONMENTAL CONCERNS

DISCHARGE FROM THE DISPOSAL AREA INTO LAKE HURON

The dredged disposal facility is designed to retain the dredging slurry for a period of time to permit settling of the solid material. The settling time within the pond can be varied by raising or lowering the height of the weir boards. The facility is designed to meet a discharge water quality standard of 30 milligrams of total suspended solids per liter of decant water. This is a criterion followed on similar DECO projects and will be controlled by varying the height of the weir during operating conditions.

To evaluate the chemistry of the discharge water from the disposal facility, laboratory analyses were made of the liquid portion of the settled slurry obtained from a mixture of tap water and samples of the proposed dredged material (sediment samples). These mixtures were designed to approximate the proportions expected during the dredging operation. The chemical analyses indicated that the inorganic chemicals arsenic, chromium, lead, and mercury are present in amounts below those specified in Michigan drinking water standards (Michigan Safe Drinking Water Act 399, 1976). Other elements tested for and found to be present include: copper, iron

maganese, nickel, zinc, nitrogen (ammonia), nitrogen (total Kjeldahl), phosphate (total). Thus present studies indicate that the chemical quality of the discharge water expected from the dredge disposal facility will not be detrimental.

When discharged water reaches Lake Huron it will be mixed with the Lake resulting in further dilution.

The quality of water being discharged from the dredged facility will be monitored and if the total suspended solids exceeds guidelines of current practice, the weir will be raised to allow for a longer period of settling before discharge. The overflow will be monitored weekly to identify: suspended solids, pH, oil, grease, and any contaminents specified by DNR. Records on file with DNR contract will include provisions to stop work to insure quality of discharged effluent. No adverse effect of the discharge waters on the municipal water supply at Harbor Beach is anticipated.

Harbor Beach Treatment Plant
Disposal Facility
The Detroit Edison Company
HLA Project Number 9961,000.14
July 24, 1980

DISCUSSION OF ENVIRONMENTAL CONCERNS

HYDROLOGIC CONDITIONS

I. Design Assumptions

Hydrologic studies were performed to evaluate the impact of the proposed construction of the dredged disposal facility on the surface drainage and flooding characteristics of the lowland area. Analyses were made of the estimated flooding prior to construction and following construction for the following conditions: 1 year, 10 year, 25 year, 50 year, 100 year, and 500 year frequency storms; 24-hour duration; under wet moisture conditions. The 1 year, 24-hour event was chosen to give an indication of the discharges which can be expected under normal conditions. The 50 year, 24-hour event data are usually used for design purposes, and the 100 year, 24-hour event is normally considered to be a worst-case situation. Ten year and 25 year, 24-hour events are usually included to establish some intermediate relationships. For design purposes the flooding event consisting of a 50 year frequency, 24-hour storm, under wet moisture conditions was assumed. The area available for temporary storage of flood waters will be reduced from approximately 120 acres to 55 acres after construction of the facility. However, the design of the facility is such that it will intercept some of the drainage from the upland

area that currently discharges into the lowland and it will intercept all of the precipitation that normally falls on the 65 acre site. The net result after construction will be a slight increase in flood level in the remaining portion of the lowland but a slight decrease in total volume of floodwater in the lowland. This floodwater drains eastward through a small culvert beneath the highway. Drainage after construction of the facility will also be through this culvert.

For analysis purposes, drainage from the upland was seperated into four drainage basins herein referred to as Basin A (northernmost), Basin B, Basin C, and Basin D (southernmost).

Drainage from four upland drainage basins traverse the bluff in Section 35. Drainage from Basin A is channeled across the lowlands and under M-25 via a double culvert. Drainage from Basin B also is channeled across the lowlands and under M-25 via a single culvert located approximately one half mile south of the double culvert. Basins C and D drain out onto the lowland south of the Basin B drainage channel. Drainage from the western area to the eastern area is controlled by the capacity of the channels and the culverts. When these capacities are exceeded, flooding occurs.

Drainage Basin A's channel and culvert are capable of accomodating the discharges of all the events simulated. The exception might be that the 100 year event's peak runoff

under wet moisture conditions may slightly exceed the estimated channel capacity.

Basin B's culvert capacities would be exceeded for both the 50 and 100 year events under wet moisture conditions. The channel capacity is also exceeded under these conditions as well as for every other condition listed with the exception of normal moisture conditions for the 1 and 10 year events and wet moisture conditions for the 1 year event.

Basin B's channel capacity is the limiting factor which determines when flooding occurs. The flood level will be slightly greater when the excess flow from Basin B and the flow from Basin C are dispersed over a smaller area because of the construction of the proposed facility. When this occurs, the channel capacity will be exceeded for every event except the 1 year event under normal moisture conditions. The culvert capacity will be exceeded under both normal and wet moisture conditions for the 50 and 100 year events and under wet moisture conditions for the 10 and 25 year events.

II. Lowland Area West of Highway M-25

In order to address the possibility of [illegible] the area bounded by the Kociba driveway on the north, Highway M-25 on the east, Rapson Road on the south, and the [illegible] west was considered. This area has, [illegible] elevation of 591 feet above mean sea level [illegible] approximately 120 acres. It receives the [illegible]

from Basins B, C, and D. The effects of flooding are summarized in Tables 1 and 2. Note that the channel capacity is the controlling factor for flooding in this lowland area.

The area between Minnick Road and Kociba driveway into which Basin A drains was not considered, since this area has a significantly higher elevation averaging approximately 594 feet above mean sea level. As shown in Table 1, after construction of the dredged disposal facility, the remaining lowland area between the northern dike and Kociba driveway would experience an increase in flood elevation of 14.4 inches above the flood elevation prior to construction for the 50 year, 24-hour event (592.6 feet to 593.8 feet).

The elevation of Highway M-25 in this area is approximately 595 feet. Therefore, the highway will not be flooded by the 50 year, 24-hour event prior to or following construction.

The amount of time it would take an event's total flooding volume to runoff prior to construction and after construction is presented in Table 3. Since the channel capacity is the controlling factor, only those data are presented. The time for mitigation of the flooding is slightly less following construction of the facility because of the decrease in the volume of floodwater.

This is the result of the interception by the disposal facility of the storm runoff from Basin D and the direct precipitation within the facility.

III. Lowland East of Highway M-25

Water levels in the natural drainage channel east of Highway M-25 during the 50-year design event will be essentially the same both prior to and following construction. This is because the channel in the lowland west of the highway which leads to the culvert under the highway, and the culvert control the flow rates from the western lowland area.

Furthermore, The Detroit Edison Company has the capability of raising the weir boards during periods of heavy rainfall, thereby allowing the dredged disposal facility to act as a temporary storage basin.

TABLE 1. Estimated Flooding of Channel

	EVENT (yr-hr)	ELEVATION OF FLOODWATER (ft)	
		Prior to Construction	After Construction
	1-24	591.3	591.4
	10-24	592.0	592.7
	25-24	592.3	593.3
Design Event	50-24	592.6	593.8
	100-24	592.8	594.2
	500-24	593.3	595.2

NOTE:

Elevation of floodwaters above a 591 foot datum. Most of the lowlands under consideration are at an elevation of 591 feet above mean sea level. Elevations prior to construction based on combined runoff from Basins B, C, and D; following construction, on combined runoff from Basins B and C.

TABLE 2. Estimated Flooding of Culvert

EVENT (yr-hr)	ELEVATION OF FLOODWATER (ft)	
	Prior to Construction	After Construction
1-24	No Flooding	No Flooding
10-24	591.4	591.6
25-24	591.7	592.1
50-24	592.0	592.7
100-24	592.2	593.1
500-24	592.7	594.0

Design Event

NOTE:

Elevation of floodwaters above a 591 foot datum. Most of the lowlands under consideration are at an elevation of 591 feet above mean sea level. Elevations prior to construction based on combined runoff from Basins B, C, and D; following construction, on combined runoff from Basins B and C.

TABLE 3. Flood Mitigation Times For Event Flood Volumes Based On Capacity of Channel

EVENT	PRIOR TO CONSTRUCTION		AFTER CONSTRUCTION	
(yr-hr)	Flood Volume[a] (acre-ft)	Flood Mitigation Time (hrs)	Flood Volume[b] (acre-ft)	Flood Mitigation Time (hrs)
1-24	32.07	2.43	28.86	2.18
10-24	118.04	8.93	112.99	8.54
25-24	153.67	11.62	147.85	11.18
50-24	189.15	14.30	182.59	13.81
100-24	217.45	15.92	210.31	15.90
500-24	278.63	21.07	270.30	20.44

Design Event

NOTES:

a) Flood volume resulting from combined volumes of Basins B, C, and D.

b) Flood volume resulting from combined volumes of Basins B and C.

Harbor Beach Dredged Spoil
Disposal Facility
The Detroit Edison Company
HLA Project Number 9901,003.14
July 24, 1980

DISCUSSION OF ENVIRONMENTAL CONCERNS

GROUND WATER CONDITIONS

I. Geologic Setting

The site for the disposal of the dredged materials occupies the relatively flat lying lowland area bounded on its eastern side by State Highway M-25 and on its western side by a north-northwest trending bluff which is approximately 15 to 20 feet high. An abandoned Chesapeake and Ohio Railroad embankment parallels the west side of the highway. The highway and railroad embankments are separated by a distance of approximately 80 feet, which contains a drainage ditch and a dense growth of trees and brush. Drainage for the lowland area is partially provided through a railroad drainage trestle and through two culverts beneath the highway. The railroad and highway embankments have resulted in ponding in the lowland area during the wet seasons, thus creating a wetland environment. During the wet seasons, the water is approximately one to two feet deep, but this usually dries up by late summer or early fall. The lowland is covered with dense vegetation ranging from grasses to trees, up to about 18 inches in diameter. A DECO transmission line traverses the southern portion of the lowland areas.

The lowland site is blanketed to a large extent by a layer of fine to course sandy soil consisting of dune sand, and beach sands and gravels with mixed layers of lacustrine

silts and clays. The thickness of these surficial sands encountered in the 7 HLA and 3 Able (lowland) borings varied from two feet near the bluff to about five feet near the east side railroad embankment.

The sandy layer is underlain by very stiff to hard till consisting of silty clays and clayey silts with varying amounts of sand and gravel and occasional cobbles interspersed in the clay matrix. Interbedded with the silts and clays are zones of silty and clayey sands. A local, approximately 10 foot thick gravel zone, was encountered in the lower portion of HLA Boring 2, just above the bedrock. The sandy zones in the till are randomly distributed and discontinuous.

The till is underlain by the Coldwater Formation, consisting of interbedded layers of siltstone, sandstone, and shale. The bedrock surface is highly weathered and the occasional shale interbeds have decomposed to clays and silty clays. The depth at which the bedrock was encountered in the HLA borings in the lowland varied between 20 to 40 feet, being deeper at the north and west ends of the lowland area.

The subsurface water in the disposal site was generally encountered at a depth of two to three feet in the HLA and Able test borings at the time they were drilled (HLA borings, June 19-22, 1979; Able borings, March 28 - April 4, 1978).

II. Occurrence of Ground Water

In the site area, ground water occurs in:

1. The upper, surficial sands.
2. In the randomly distributed and discontinuous sand and gravel pockets in the till.
3. Possibly in the joints and fractures of the underlying bedrock.

The fine grained portions of the lacustrine silts and clays and of the till, act as an aquiclude. That is, their ability to transmit water is so low they cannot be considered to be a source of water for wells.

A. Surficial Sands. The water in the surficial sands is perched on the underlying till. The sand deposits are relatively fine grained, have a low transmisivity, and are essentially flay lying, thus the hydraulic gradiant is essentially flat. From this setting, it can be inferred that the ground water flow rates are very slow. The surficial sand is recharged by direct infiltration from rainfall.

Based on our understanding of the geology of the area and on published mapping of the surficial soils (U.S. Department of Agriculture, Soil Conservation Service, 1980, Soil Survey of Huron County, Michigan: Covert - Tobico complex and Pipestone - Tobico - Adrian complex), the thin surficial sand deposits present throughout most of the site originally formed a continuous cap extending from the bluff to essentially the Lake Huron shoreline. The ground water in these surficial sands would have drained northeastward from the bluff area to the Lake. It is suspected that during the construction

of the highway fill for M-25 and/or the railroad embankment that the sands were at least partially removed and the fills for either or both the highway and the railroad embankment are resting on the underlying till. This would then explain the blockage of the aquifer and result in the condition seen today of the ponding of water on the west side of both these embankments.

Furthermore, since these sands are present essentially at the ground surface, they in our opinion do not represent a good, potential source for potable water, unless that water is treated to assure drinking quality standards. Since these sands are recharged by direct infiltration, this aquifer unit is subject to contamination from decaying organic material in the ponded areas on the west side of Highway M-25, contamination from seepage from barnyard areas, and contamination from fertilizers used in the cultivated areas. Also, the gradation of the sand and thickness is such that only low yield wells would be possible.

Reported springs in the area most likely occur where the surficial sands have been breached and the perched water either fills a depressional area or seeps into an adjacent drainageway.

B. Sand and Gravel Pockets in Till. The discontinuous sands and gravels in the till may be a source of water for low yield wells. Recharge to these discontinuous sand and gravel pockets is through the slow infiltration from the

relatively impervious till. Wells developed in such sand and gravel pockets generally are limited in quantity and have a history of going dry during periods of heavy pumpage.

C. Upper Coldwater Formation. Only low yields of ground water would be anticipated from the joints and fractures in the relatively impervious underlying bedrock. Water which is present in the bedrock is recharged through the slow infiltration from the overlying and relatively impervious till.

III. Design of Spoil Disposal Facility

The spoil disposal facility will occupy approximately 65 acres of the lowland area extending from the railroad embankment on the east to the bluff on the west and from Rapson Road on the south to approximately 3000 feet north. Construction of the facility will consist of exterior dikes with a key trench cut through the surficial sand deposits to the underlying impervious till and backfilled with impervious till from the adjacent upland area. This key trench will effectively cut off the interconnection of the surface sands beneath the disposal area with those on the outside of the disposal area. The dikes will also be constructed of relatively impervious till.

Furthermore, the dredged material, which will be placed within the diked area is fine-grained and will tend effectively seal the surficial sand layer and essentially prevent infiltration into this layer.

IV. Impact of the Disposal Facility on Ground Water Resources

A. Seepage

1. Seepage of water from the disposal facility into the surficial sand outside of the diked area will be effectively prevented by the construction of a key trench cutoff.

2. The till which underlies the thin surficial sand layer is essentially impervious and is not considered to be a ground water aquifer.

3. The randomly distributed and discontinuous sand and gravel deposits within the till are separated from the pond by the impervious till.

4. Ground water which may be present in the upper portions of the Coldwater Formation is separated from the bottom of the dredged disposal facility by an excess of 25 feet of impervious till.

B. Recharge

1. Recharge to the surficial sand aquifer is by direct infiltration from rainfall. Removal of 65 acres from the recharge area will not impact on the amount of recharge available to this aquifer unit in areas outside of the dike.

2. There are no known continuous sand and gravel deposits within the till. Recharge to those deposits which are present is through the extremely slow seepage of rainfall through the surrounding till. Since the sand and gravel deposits within the till are randomly distributed and discontinuous, the dredge disposal facility will have no effect

upon recharge to those deposits which are located outside of the diked facility.

3. The upper portion of the Coldwater Formation cannot technically be considered to be an aquifer unit. Water which is present within joints and fractures is recharged through the slow infiltration from the overlying materials. This infiltration will continue in all areas outside of the diked facility.

DISCUSSION OF ENVIRONMENTAL CONCERNS

FISH AND WILDLIFE HABITAT

Land Usage

The proposed site for the dredged spoil disposal facility is located essentially at the southern end of the lowland area herein defined as the area between the bluff on the west and Lake Huron on the east. This lowland area extends northward from approximately one quarter mile south of Rapson Road to Rubison Road.

The number of acres on a section-by-section basis of this lowland area are presented in Table 1. There are approximately 1745 acres in the total lowland of which the proposed facility will occupy approximately 65 acres. In addition, approximately 22 acres of upland area will be utilized to obtain borrow material for construction of the dikes.

The location of the facility near the southern end of the lowland area is important because it will not block access to extensive feeding areas for wildlife located south of the facility. There are only 80 acres of this lowland area south of Rapson Road and those are partially developed with residential dwellings.

TABLE 1. Summary of Number of Acres of Lowland Area

LOCATION			DESCRIPTION	ACRES
T	R	SEC		
16N	15E	1	Radio Tower to Rapson Road	80.2
17N	15E	35,36	Rapson Road to Minnick Road	441.5
17N	15E	26,27	Minnick Road to Swayze Road	247.6
17N	15E	22,23	Swayze Road to Filion Road	293.0
17N	15E	15	Filion Road to Dobson Road	498.4
17N	15E	9, 10	Dobson Road to Rubicon Road	183.9
			TOTAL LOWLAND ACRES	1744.6

DREDGED SPOIL DISPOSAL FACILITY

SITE SELECTION CONSIDERATIONS

HARBOR BEACH, MICHIGAN

DECEMBER 23, 1980

THE DETROIT EDISON COMPANY

Introduction

The purpose of this report is to clarify and further define the application by The Detroit Edison Company for construction of a diked disposal facility for spoil to be dredged from the harbor at Harbor Beach, Michigan (DNR File No. (79-11-129G).

Included herein is discussion of the following:

- The need for dredging of the harbor ship channel.
- The methods and procedures considered for dredging and disposing of the dredged spoil.
- The considerations which affected the selection of the lowland disposal site.

Conclusion

Alternative sites for location of the diked disposal facility for dredged spoil from the harbor at Harbor Beach, Michigan, were considered for implications of land usage, cost, aesthetics and concerns of area residents. It is concluded that the lowland site, lying north of Rapson Road and west of highway M-25, is the only prudent alternative.

Need for Dredging

The ship channel within the harbor at Harbor Beach, Michigan, was last dredged in 1967. Since then sediments accumulating in the harbor have caused the channel to become filled in. The objective in dredging the ship channel is twofold:

1. To ensure the safety of the ships currently delivering coal to the Harbor Beach Power Plant; and
2. To ensure the continuance of marine delivery of coal to the power plant as lake levels decline from their present peak levels.

It is estimated that approximately 750,000 cubic yards of harbor bottom sediments must be initially dredged to restore the ship channel to its design depth. Because of future anticipated continuing siltation, maintenance dredgings of approximately 150,000 cubic yards each are planned at 5-year and 10-year periods following the initial dredging.

Method of Dredging

Previous Harbor Dredging Method

The U.S. Army Corps of Engineers used a dipper dredge for the 1967 dredging of the then-predominantly rock bottom of the ship channel. The dredged material was deposited in an approved deep water disposal area lying northeast of the harbor breakwater. It is our understanding that current EPA Region V guidelines prohibit the open lake disposal of the harbor sediments which now need to be dredged at Harbor Beach.

Proposed Method of Dredging

The most effective and efficient method for dredging the present sediments at Harbor Beach is by employing a hydraulic dredge. Reasons for this include the following:

1. The volume of dredged spoil is very large, being estimated at 750,000 cubic yards.
2. The sediments are extremely fine-graded. Consisting primarily of organic silts and silty clay, more than 90 percent by weight is finer than a 200 mesh sieve. This material would simply pass through the bucket or jaws of a mechanical-type dredge.
3. The permitted time period for dredging operations is restrictive for the volume of sediments to be dredged. Currently, dredging of the harbor is not allowed from April 1st until May 31st, and again from August 15th until October 31st, so as not to disrupt the use of the harbor bottom habitat by aquatic plants and wildlife. A seasonal (once/year) period of 75 days is available for dredging.

For the aforementioned reasons, the use of a barge-mounted crane with a clam-shell bucket is not a feasible method of dredging the sediments at Harbor Beach.

Spoil Disposal Alternatives

The particle size distribution and the low permeability of the sediments at Harbor Beach are critical factors affecting the method of dredging and the selection of feasible disposal facilities. It was previously noted that hydraulic dredging is the only feasible method of dredging the sediments.

Hydraulic dredging operations combine the sediments with lake water to form a slurry containing approximately 20 percent solids by weight. The slurry is then pumped through a pipeline to on-shore handling and containment facilities.

Spoil disposal alternatives include the following:

Existing Approved Disposal Site

The U.S. Army Corps of Engineers operates an approved disposal facility at the mouth of the Saginaw River. Sufficient capacity is available at this facility to accommodate the estimated volume of dredged spoil from Harbor Beach.

However, transportation of the dredged slurry to this approved site is impractical. Hydraulic dredging performed at the forecasted rate of 10,000 cubic yards per day (750,000 cubic yards ÷ 75 days) immediately eliminates slurry transportation by barge, trucks or other carriers.

To become suitable for transportation, the slurry must first be dewatered. This necessitates construction of extensive temporary handling and containment facilities, to hold the slurry until the sediments settle out. To be effective, these temporary facilities must be designed and built to the same criteria to the proposed basin, already carefully located and engineered to its most optimum features. The slurry also has poor dewatering properties due to the fine gradation and low permeability of the sediments. There is no economically feasible method of accelerating the settlement rate, and thereby reducing the detention time of the slurry and required storage capacity of the containment facilities.

The cost of constructing temporary handling and containment facilities, with their attendant disruptive impacts, plus the costs of handling and transporting the spoil to its final location, could increase the cost of dredging by a factor of 2 or 3, and therefore precludes further consideration of the existing disposal site.

Construction of Diked Disposal Facility

Over the past six years the Corps of Engineers attempted without success to locate a suitable nearby site to receive public dredgings. After the Corps had exhausted all reasonable alternatives, The Detroit Edison Company agreed to provide privately-owned property for this purpose. Initially, large acreages of Edison-owned properties in the vicinity of Harbor Beach were inventoried and assessed in terms of engineering, environmental and agricultural considerations.

Realizing that local residents in this predominantly agricultural area would strongly oppose the use of farmland for disposal of dredged spoils, the minimizing of the impact on farmlands was a major consideration.

The method of slurry conveyance and the minimizing of handling were also major considerations. The hauling of slurry in trucks (estimated at 250 trucks per day continuously) through the City of Harbor Beach would be opposed by the area residents, even with the requirement that the trucks be fitted with special watertight tanks to minimize spillage. Installation of a slurry pipeline through the developed portions of Harbor Beach would be very costly, and also opposed by the local residents due to disruption during construction and concerns regarding safety.

Excluding farmlands, the remaining Edison-owned land appears to be classified as wetland by regulatory definition. After careful consideration, a lowland area located approximately 1.5 miles north of the harbor was selected as the most prudent site for the disposal facility, with an adjacent upland area selected as an alternate site.

The lowland site was found to have several advantages over the other sites considered, including:

1. Close proximity to the harbor.
2. Edison-owned former railroad right-of-way, to serve as the pipeline route, extending from the harbor up to the site.
3. Minimal impact on farmland.
4. Favorable topographic and geologic conditions.

The succeeding sections of this report review the considerations affecting the site selection of the disposal facility in detail, specifically comparing the lowland site with the alternate upland site.

Disposal Site Selection

Topographic Considerations

Topographic considerations affecting the selection of a disposal site for the dredged slurry include:

1. Relief

   The upland area is essentially a level plain, and offers no natural relief which could be incorporated into a diked disposal facility.

   The lowland site topography is better suited for a diked disposal facility. The 30-ft. high bluff can be readily utilized as the

west dike for the facility. Additionally, the abandoned railroad road-bed would be incorporated as part of the east dike.

2. Stormwater Run-off

For an upland disposal site, the drainage channels which presently traverse the upland area would likely be re-routed around the disposal facility. No storage of stormwater run-off would be provided by an upland disposal facility.

Lowland storage capability for stormwater run-off would be enhanced by a lowland disposal facility. Some of the run-off carried by the upland drainage channels, which is presently dumped onto the lowland, would be intercepted and stored by the disposal facility until discharged with the decant water.

3. Bluff Stability

It would be necessary to investigate the stability of the 30 foot bluff for an upland disposal facility. Re-shaping could be required to insure slope stability and to control and minimize surface erosion of the bluff.

Land Considerations

Land considerations affecting the selection of a disposal site for the dredged slurry include:

1. Existing Usage

The upland site is productively utilized for growing corn at the present time. This usage would cease with the commencement of construction of the disposal facility.

Terrestrial base line studies identified a flatland area bounded by a bluff on the west, Lake Huron on the east, Filion Road on the north, and extending south of Rapson Road about one-quarter mile. The total acreage of the flatland area is 1,745 acres, and is described primarily as woodlot, marsh and meadow.

The drawing which follows is taken from the terrestrial base line studies performed by Hazleton Environmental Sciences Corporation. Identified on the drawing is the extent of the vegetation and habitat in the total flatland area and the adjacent upland area.

The lowland site for the disposal facility is located near the southern limit of the total defined flatland area. No unique, threatened or endangered species of vegetation or wildlife were found in the lowland area.

2. Land Encumbered

For the upland site the design concept consists of a two-celled disposal facility. Tht total estimated acreage required is 66 acres. No borrow pits for dike material will be required. Dike material will be excavated from within the upland site itself. The upland site is open and unshielded from wind effects. The multi-celled concept reduces the water surface area in each cell, thereby minimizing the effect of wind on turbidity and wave generation. Dikes at the upland site would be 12-15 feet in height above existing ground. The design freeboard would be 3 feet, instead of the 2 feet for the lowland site, to better shield the facility.

The lowland site facilitates the use of the "steady-state" concept of dredged slurry disposal in a single diked basin. The diked basin would cover approximately 65 acres, which is less than 4% of the total defined flatland area. No plant or animal habitat was identified within the lowland site which was unique to the defined flatland area.

The lowland site topography is favorable for a disposal basin. The natural bluff would be utilized as the west dike, and the abandoned railroad road-bed would be incorporated as part of the east dike. Only about 23 acres of upland area would be required for dike material borrow pits. Dike height would be 14 feet, with a design freeboard of 2 feet.

Environmental Considerations

Environmental considerations affecting the selection of a disposal site for the dredged slurry are limited primarily to loss of wildlife habitat and aesthetics. Neither the upland site nor the lowland site has any outstanding historic, cultural, or scenic value.

1. Loss of Wildlife Habitat

Wildlife habitat in the area is largely found in the defined flatland area. The diked disposal facility at the lowland site would cover approximately 65 acres of the flatland area, or less

than 4% of the total flatland acreage of 1,745 acres. The impact on wildlife habitat due to construction of the facility at a lowland site is therefore considered as minimal.

Further, the loss of this lowland area for wildlife habitat is not permanent. The utilization of the facility would be completed following the second maintenance dredging of the harbor. A permanent wetland environment could be created by adjusting the elevation of the weir to retain one foot of water in the basin when the clear supernatant is discharged.

On the other hand, all of the clear water in the basin could be drawn off, leaving a blanket of enriched soil in the diked area. Should this occur, the trees, shrubs, grasses and other vegetation common in the area would rapidly carpet the basin. Storm water run-off carried by the upland drainage channels would continue to be intercepted by the basin, and thereby provide a natural water supply to support the vegetation and wildlife which returns to the area.

Finally, construction of the disposal facility at the upland site would also impact the existing environmental conditions prevalent in the lowland area. It was previously noted that the drainage channels which presently traverse the upland area would be re-routed around the disposal facility because of the extensive acreage required. This would likely change the manner in which the lowland area is flooded by stormwater run-off. Additionally, the tributary area of the upland drainage channels would be lessened by 150 acres, since rainfall which falls on the facility would be retained in the basin until discharged with the clear supernatant from the dredged slurry.

2. Aesthetics

A disposal facility located on an upland site would be much more visible than one on a lowland site. The upland area, which is about 30 feet higher in elevation than the adjacent lowland, is largely open and unshielded by trees or other natural features that would screen a 12-15 foot high diked facility.

A diked disposal facility on a lowland site would be much less intrusive. Natural screening would be provided by the trees and brush in the lowland area lying between the abandoned railroad road-bed and highway M-25. Also, the 30-foot bluff in the background would minimize the visual impact of the 14-foot high diked facility.

Economic Considerations

Economic considerations include both the construction of the facility, and its utilization during dredging of the harbor. A disposal facility at the upland site, when compared with at the lowland site, would result in increased costs for The Detroit Edison Company, and eventually its customers.

1. Construction Cost

The increased construction cost for the disposal facility at the upland site is due largely to increased requirements for dike material. About 133,000 cubic yards of dike material would be required to construct the north, east, and south dikes of the facility at the lowland site, with the natural bluff being used as the west dike. By comparison, about 182,000 cubic yards of dike material would be needed to construct the facility at the upland site.

The placing and compacting of this additional 49,000 cubic yards of dike material is estimated to cost $300,000. This increased cost is nearly 20 percent of the total estimated construction cost for the facility at the lowland site.

2. Operation Cost

To pump the dredged slurry to the disposal facility at the lowland site, system requirements include approximately 7,000 lineal feet of on-shore pipeline, from 1,500 to 4,000 lineal feet of floating pipeline, and a static head due to rise in ground elevation of 25 feet. It is estimated that a dredging contractor employing a 22-inch diameter dredge with one pipeline booster pump station, could complete the dredging of the 750,000 cubic yards of sediment in 73 days.

To reach the upland site an additional 2,000 lineal feet of an on-shore pipeline is required. Also, the static head due to increase in ground elevation increases by 30 feet, for a total static head of 55 feet. It is estimated that a dredging contractor employing a 22-inch diameter dredge with one pipeline booster pump station, could complete the dredging in 91 days.

Increased operation costs for the upland disposal facility are attributable to lessened system efficiency due to longer pipeline length and substantially increased static head. Using 1982 cost projections, the estimated increased cost for disposing of 750,000 cubic yards of sediment at the upland site is $585,000 more than disposing of the sediments at the lowland site.

Community Concerns

Community concerns affecting the selection of a disposal site for the dredged slurry include:

1. Farmland Preservation

   Area farmers have indicated a strong preference for preservation of existing farmland over its development for other purposes. Use of the upland site would remove approximately 96 acres of farmland from productive agricultural usage for at least 10 years.

2. Impact Upon Deer Habitat

   The diked disposal facility at the lowland site would cover approximately 65 acres, or less than 4% of the total flatland acreage available for wildlife habitat. The loss in habitat is therefore minimal.

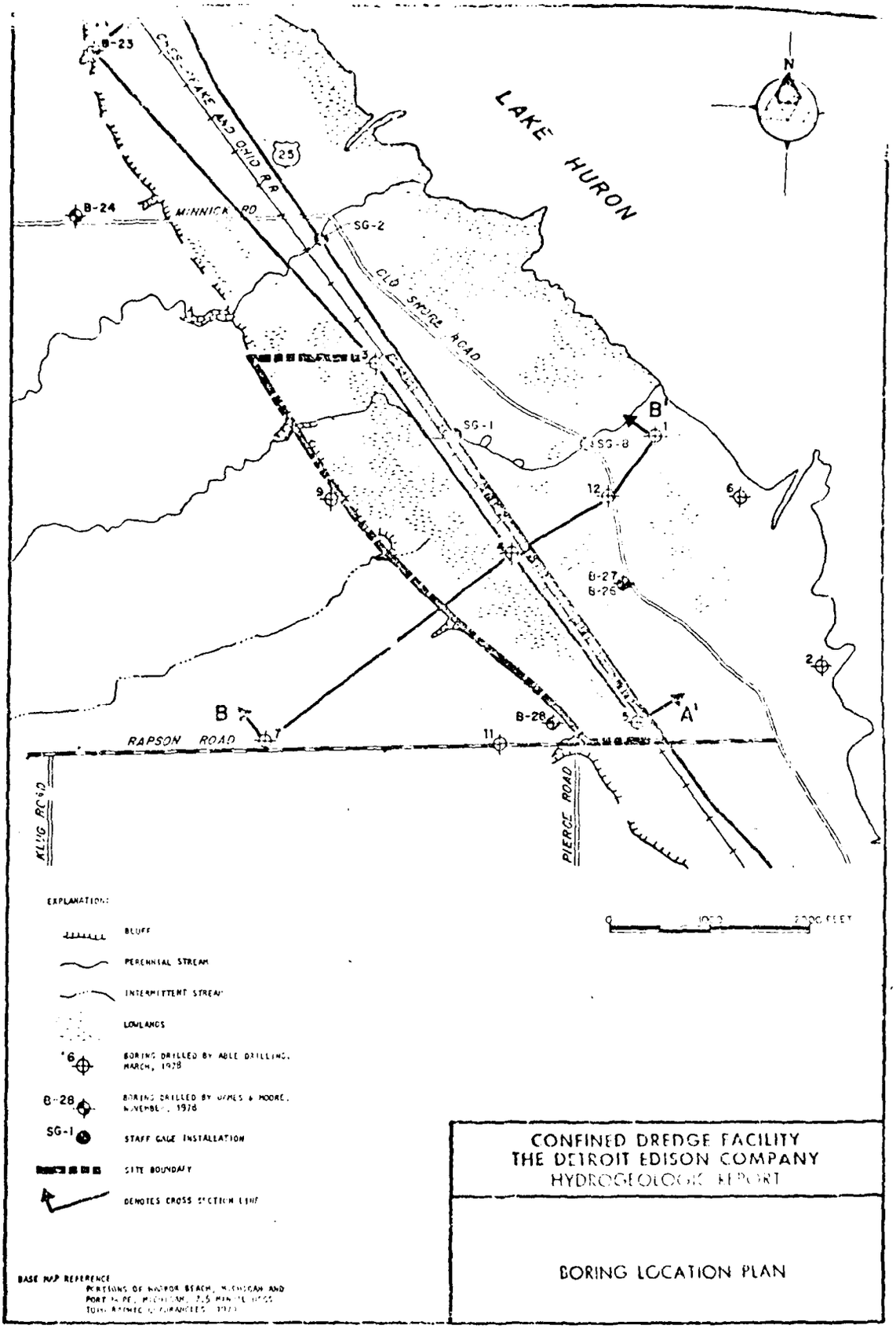
   The chief impact could possibly be a change in deer movement patterns. Terrestrial base line studies noted that deer moved along a corridor between the bluff and the abandoned railroad road-bed, with Rapson Road being the southern limit of movement. The lowland disposal facility could cause the southern limit to be shifted about one-half mile northward, to the north boundary of the facility.

3. Levels of Ponded Water

   Another concern was a potential increase in levels of ponded water in the lowland area adjacent to the diked disposal facility at a lowland site. Hydrological studies have indicated that only minor temporary increases in levels of ponded water, would be experienced in the adjacent lowland area during rainstorms. There will be no flooding of highway M-25.

APPENDIX 4

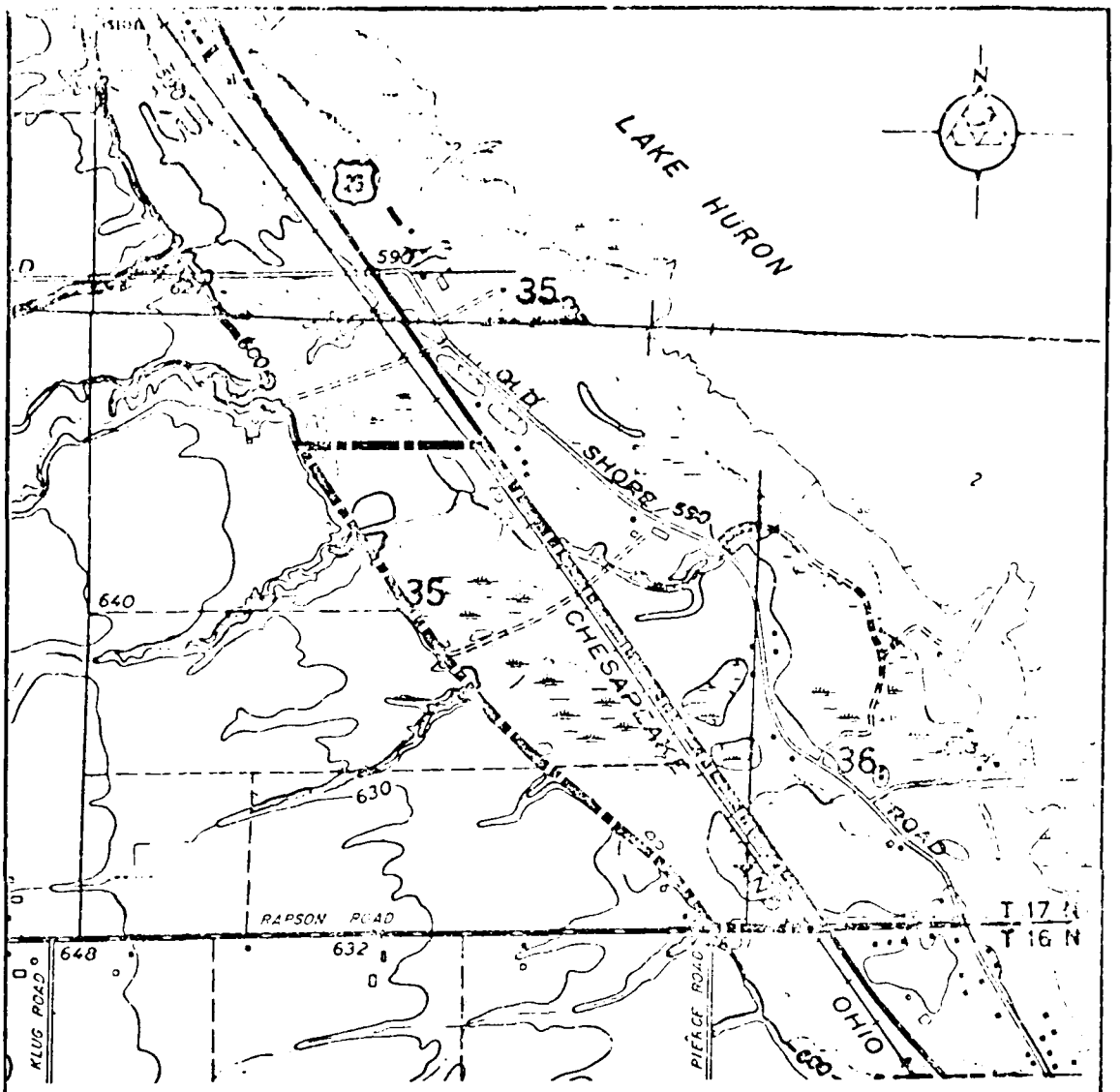
Soil Boring Location Plan and Other
Data from the Dames and Moore
Hydrogeologic Report



CONFINED DREDGE FACILITY
THE DETROIT EDISON COMPANY
HYDROGEOLOGIC REPORT

BORING LOCATION PLAN

7638-020-07 DAMES & MOORE



EXPLANATION

SITE BOUNDARY

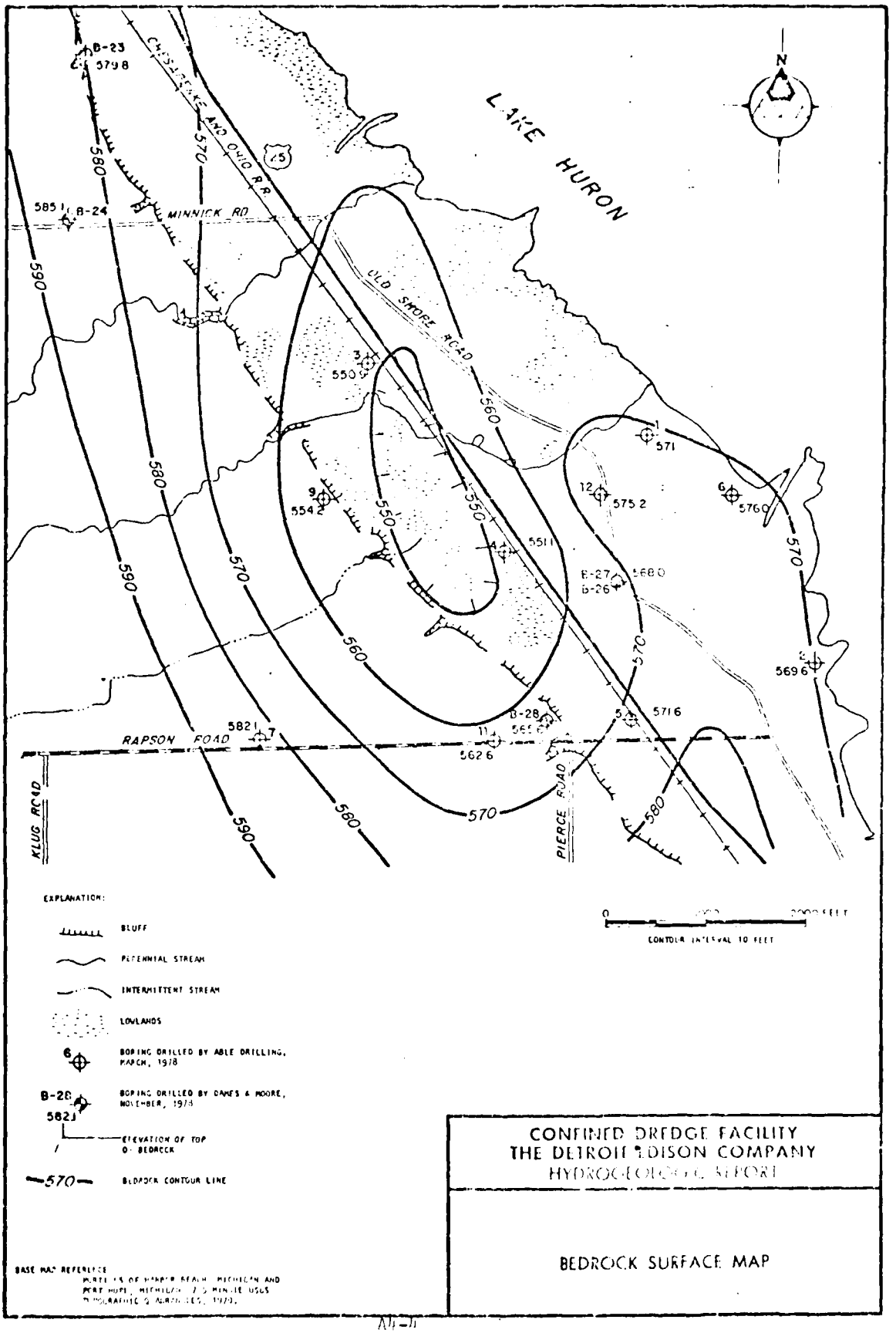
BASE MAP REFERENCE

PORTIONS OF HARBOR BEACH, MICHIGAN AND PORT HOPE, MICHIGAN 7½ MINUTE TOPOGRAPHIC QUADRANGLES, 1970.

CONFINED DREDGE FACILITY
THE DETROIT EDISON COMPANY
HYDROGEOLOGIC REPORT

SITE PLOT PLAN

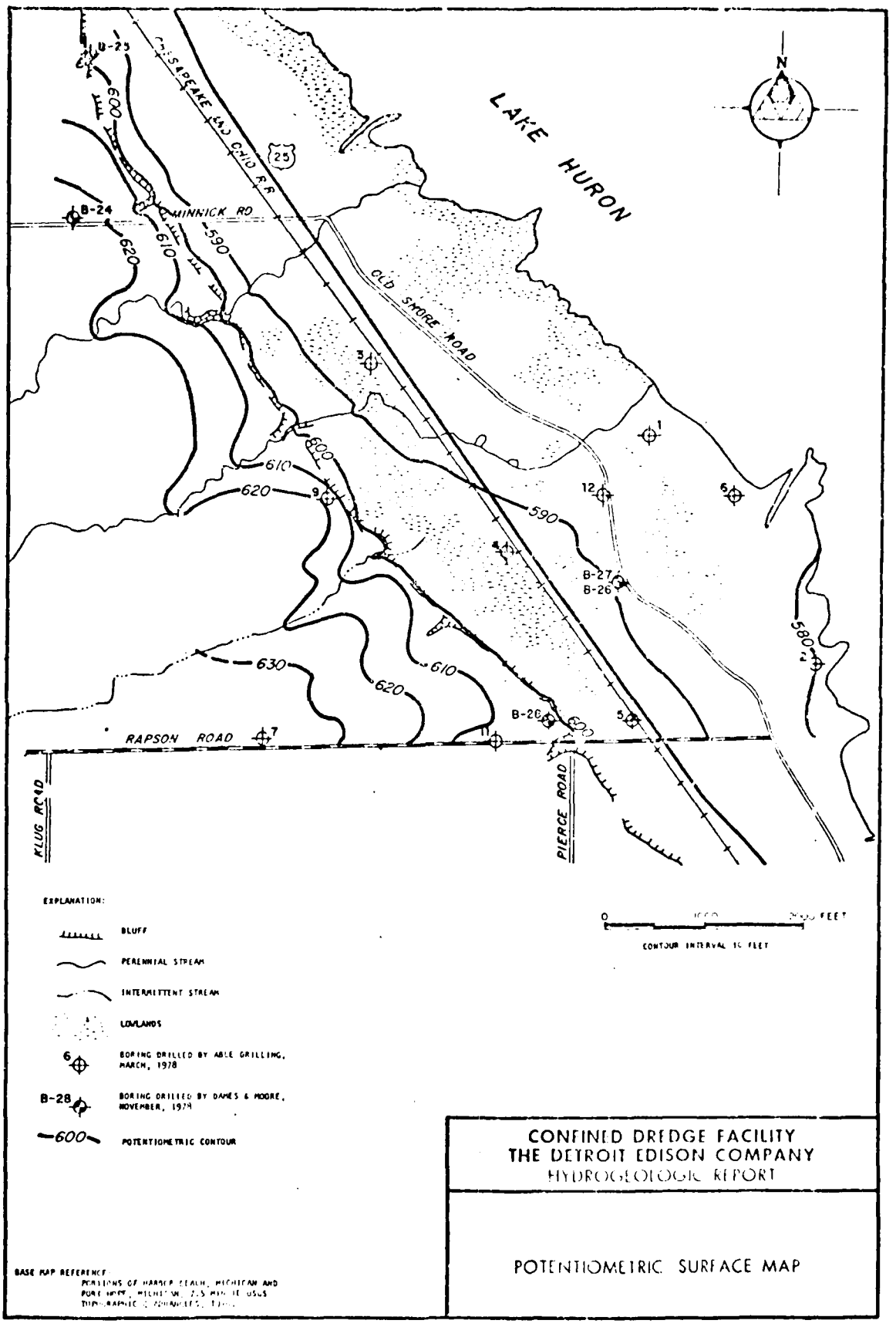
7638-020-07 RAMEY & MOORE



CONFINED DREDGE FACILITY
THE DETROIT EDISON COMPANY
HYDROGEOLOGIC REPORT

BEDROCK SURFACE MAP

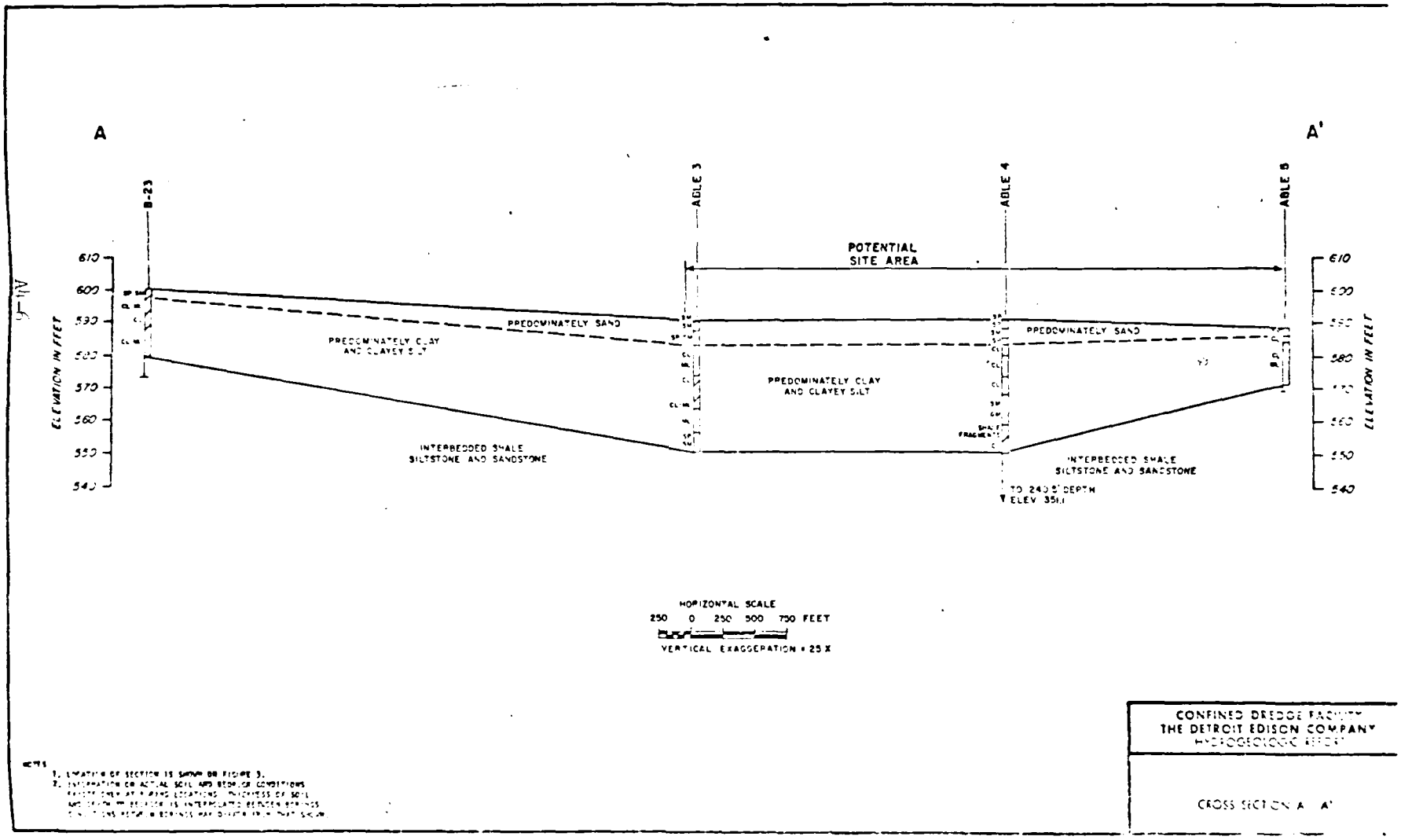
7638-020-07 DAMES & MOORE



CONFINED DREDGE FACILITY
THE DETROIT EDISON COMPANY
HYDROGEOLOGIC REPORT

POTENTIOMETRIC SURFACE MAP

7638-C20-07 DAMES & MOORE

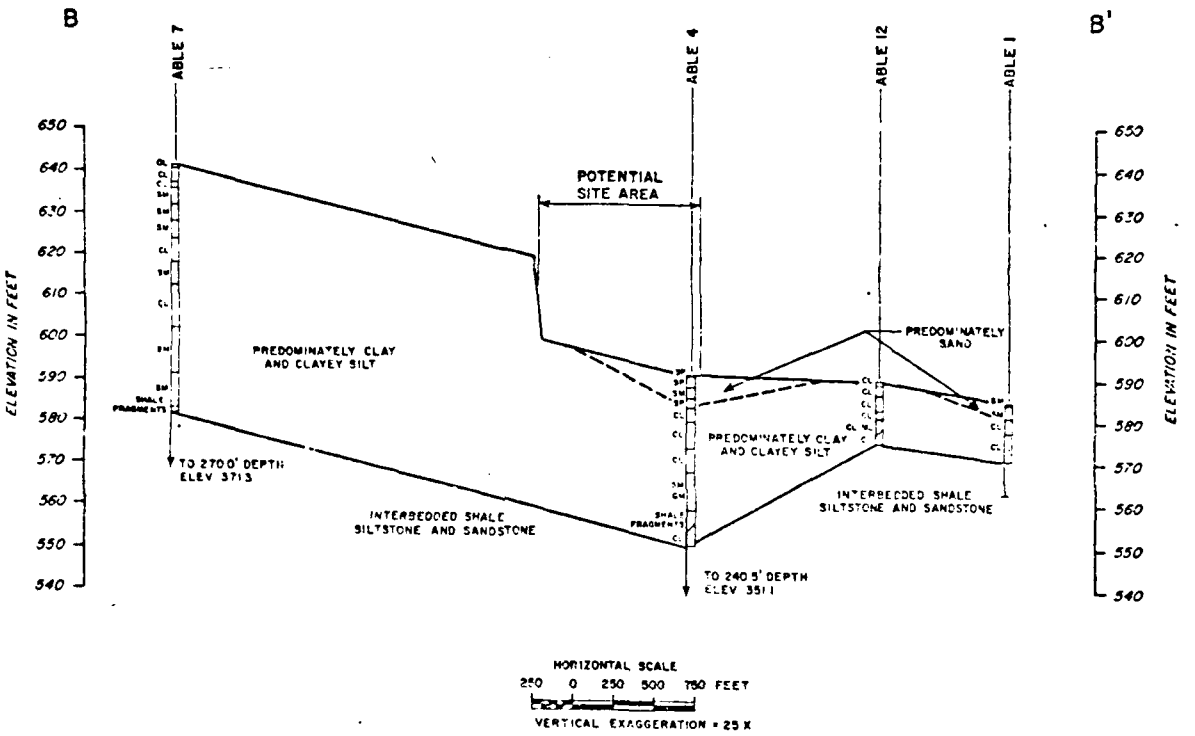


NOTES

1. LOCATION OF SECTION IS SHOWN ON FIGURE 3.
2. EXTRAPOLATION OF ACTUAL SOIL AND BEDROCK CONDITIONS
EXISTS ONLY AT BORING LOCATIONS. THICKNESS OF SOIL
AND DEPTH TO BEDROCK IS INTERPOLATED BETWEEN BORINGS
AND MAY DIFFER FROM THAT SHOWN

CONFINED DREDGE FACILITY
THE DETROIT EDISON COMPANY
HYDROGEOLOGIC REPORT

CROSS SECTION A - A'

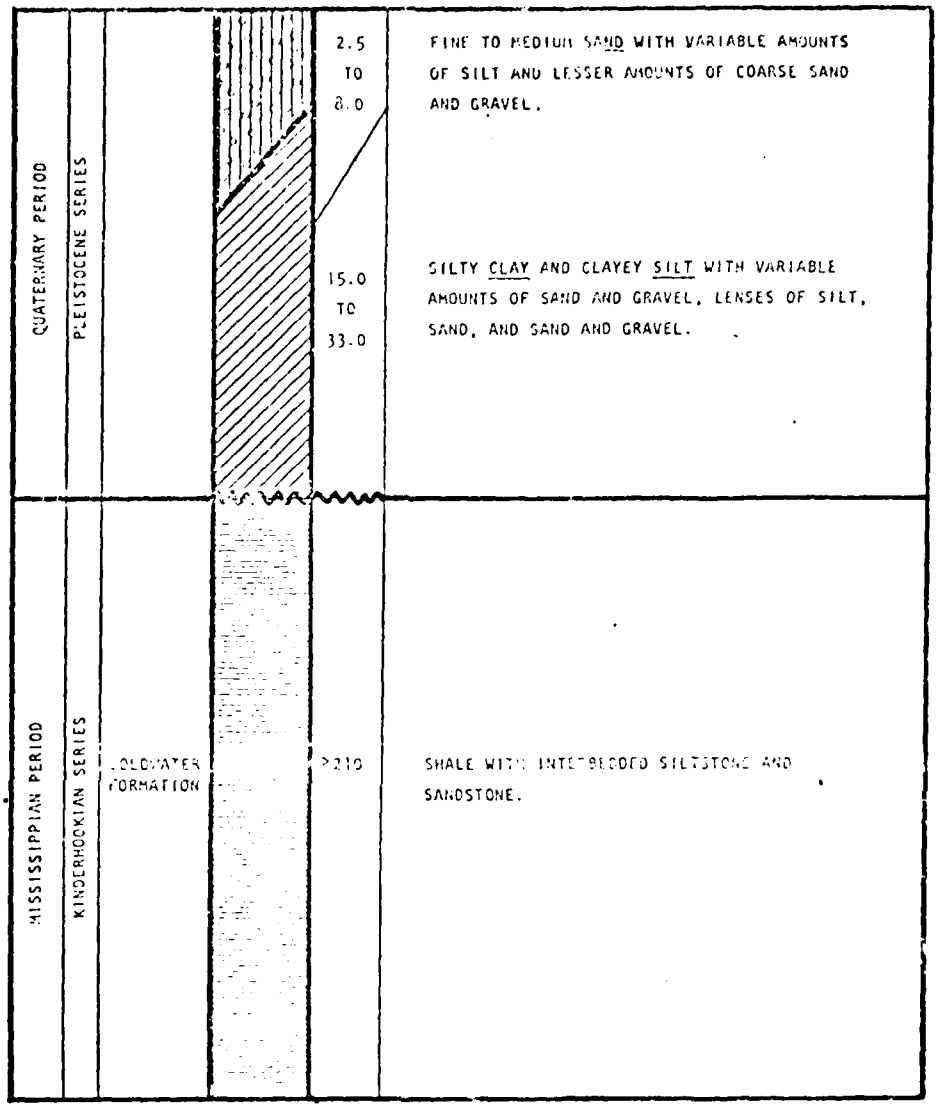


NOTES
1. LOCATION OF SECTION IS SHOWN ON FIGURE 3.
2. INFORMATION ON ACTUAL SOIL AND BEDROCK CONDITIONS EXISTS ONLY AT BORING LOCATIONS. THICKNESS OF SOIL AND DEPTH TO BEDROCK IS INTERPOLATED BETWEEN BORINGS. CONDITIONS BETWEEN BORINGS MAY DIFFER FROM THAT SHOWN.

CONFINED DREDGE FACILITY
THE DETROIT EDISON COMPANY
HYDROGEOLOGIC REPORT

CROSS SECTION B - B'

7638-020-07



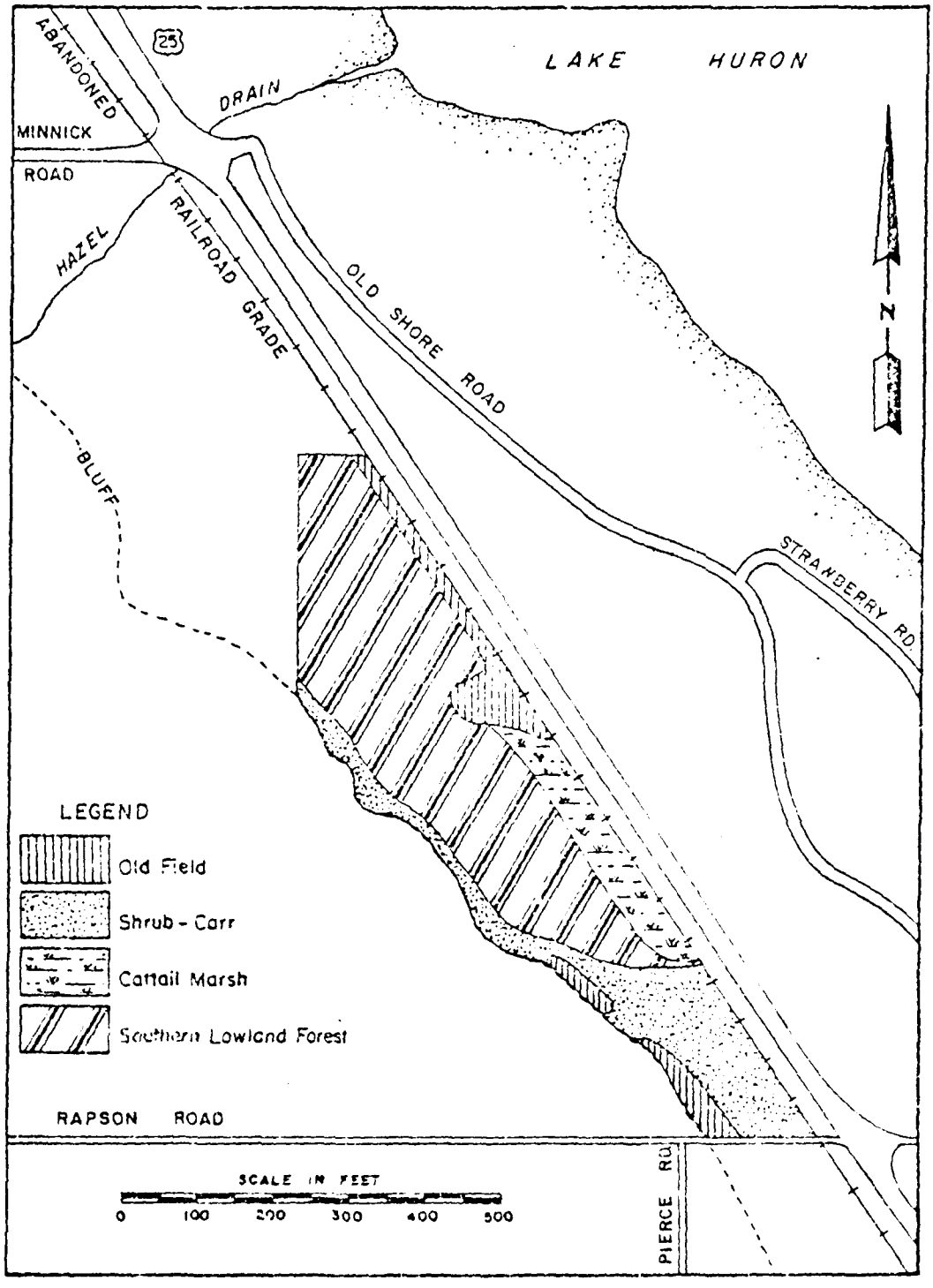
CONFINED DREDGE FACILITY
THE DETROIT EDISON COMPANY
HYDROGEOLOGIC REPORT

SITE STRATIGRAPHIC COLUMN

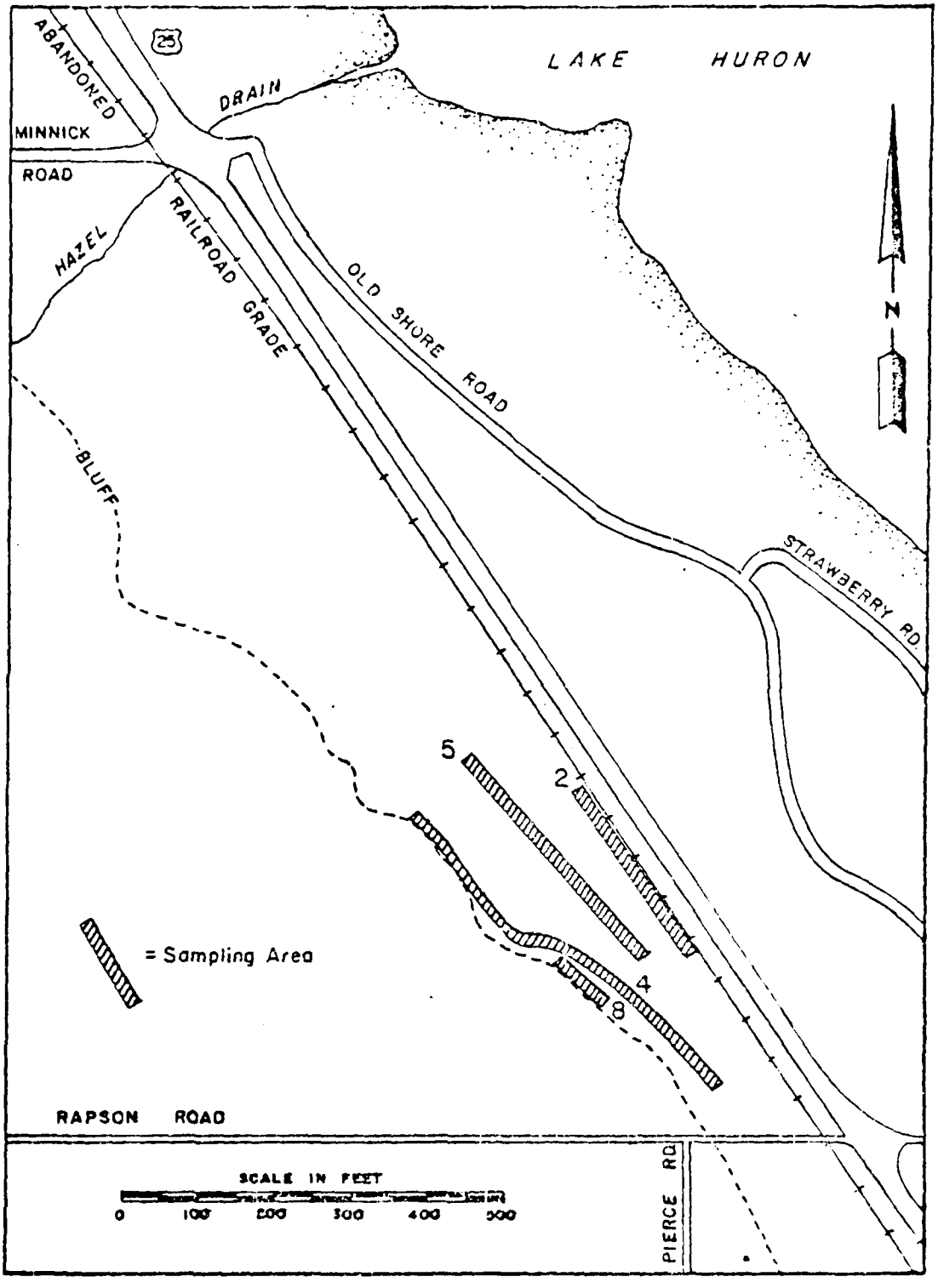
7638-020-07 DAMES & MOORE

APPENDIX 5

Fauna and Flora Inventory Lists
from the Hazleton Report



Vegetation/habitat map of the proposed disposal site, Rubicon Township, Huron County, Michigan, 1978.



Terrestrial sampling locations at the proposed disposal site, Rubicon Township, Huron County, Michigan.

Table 4-2. Phytosociological data summary of the ground layer in the Cattail Marsh (SA 2) at the proposed disposal site, Rubicon Township, Huron County, Michigan, May, June, and September 1978.

Species	May		June		September	
	Frequency	Relative Frequency	Frequency	Relative Frequency	Frequency	Relative Frequency
Lemna sp.	100.0	19.5			13.3	1.8
Typha sp.	93.3	18.2				
Lysimachia nummularia	93.3	18.2	46.7	14.0	100.0	13.6
Carex sp.	66.7	13.0				
Impatiens sp.	40.0	7.7	33.3	10.0	26.7	3.6
Galium sp.	33.3	6.4	33.3	10.0	66.7	9.0
Sium suave	33.3	6.4	6.6	2.0	20.0	2.7
Carex sp.	26.7	5.2			13.3	1.8
Veronica scutellata	26.7	5.2	20.0	6.0		
Polygonum sp.			53.3	16.0		
Typha latifolia			33.3	10.0	86.7	11.8
Typha angustifolia			33.3	10.0	66.7	9.0
Eleocharis sp.			26.7	8.0		
Labiatae			13.3	4.0		
Glyceria borealis			13.3	4.0	46.7	6.3
Carex lacustris			6.6	2.0		
Carex lupulina			6.6	2.0	6.6	0.9
Carex intumescens			6.6	2.0		
Bidens cernua					86.7	11.8
Polygonum hydropiperoides					46.7	6.3
Eleocharis palustris					33.3	4.5
Scutellaria lateriflora					33.3	4.5
Geranium maculatum					26.7	3.6
Epilobium adoratum					13.3	1.8
Poa palustris					13.3	1.8
Alisma plantago-aquatica					6.6	0.9
Scirpus cyperinus					6.6	0.9
Asclepias incarnata					6.6	0.9
Rumex crispus					6.6	0.9
Polygonum scandens					6.6	0.9
Average Community Ground Layer Cover	34%		78%		89%	

Biomass and productivity of four communities at the proposed disposal site, Rubicon Township, Huron County, Michigan, September 1978.

Community	Biomass (kg/ha)	Productivity (kg/ha/yr)
Cattail Marsh (SA2)		
Ground layer	8,889	8,889
Total	8,889	8,889
Shrub Carr (SA4)		
Shrub layer	8,390	2,405
Ground layer	968	968
Total	9,358	3,373
Ash Swamp (SA5)		
Trees and saplings	331,064	11,636
Shrub stratum	95	100
Ground layer	799	799
Total	331,958	12,535
Moist Old Field (SA8)		
Shrub stratum	4,528	907
Ground layer	2,650	2,650
Total	7,178	3,557

. Phytosociological data summary of the ground layer in the Moist Old Field (SA 8) at the proposed disposal site, Rubicon Township, Huron County, Michigan, May, June, and September 1978.

Species	May		June		September	
	Frequency	Relative Frequency	Frequency	Relative Frequency	Frequency	Relative Frequency
Poa sp.	93.3	24.6				
Solidago sp.	86.7	22.8	73.3	11.3		
Daucus carota	80.0	21.1	40.0	6.2	80.0	8.8
Fragaria virginiana	33.3	8.7	73.3	11.3	90.0	10.0
Equisetum arvense	20.0	5.3	26.7	4.1	5.0	0.6
Antennaria neglecta	13.3	3.5	6.6	1.0	15.0	1.7
Plantago sp.	13.3	3.5				
Taraxacum officinale	6.6	1.8	26.7	4.1		
Potentilla anserina	6.6	1.8			5.0	0.6
Melilotus sp.	6.6	1.8			5.0	0.6
Hieracium sp.	6.6	1.8				
Cornus stolonifera	6.6	1.8			10.0	1.1
Viola consperca	6.6	1.8				
Poa compressa			93.3	14.4	100.0	11.1
Carex laxiflori			66.7	10.3	70.0	7.7
Juncus balticus			46.7	7.2	30.0	3.3
Achillea millefolium			33.3	5.2	85.0	9.4
Plantago lanceolata			26.7	4.1	25.0	2.8
Phleum pratense			26.7	4.1	45.0	5.0
Carex projecta			13.3	2.1		
Geum sp.			13.3	2.1		
Fraxinus pennsylvanica			6.6	1.0	15.0	1.7
Cerastium arvense			6.6	1.0		
Trifolium aureum			6.6	1.0		
Chrysanthemum leucanthemum			6.6	1.0		
Hypericum perforatum			6.6	1.0	5.0	0.6
Poa pratensis			6.6	1.0	90.0	10.0
Agrostis stolonifera			6.6	1.0		
Rumex acetosella			6.6	1.0		
Danthonia spicata			6.6	1.0	15.0	1.7
Panicum lanuginosum			6.6	1.0		
Plantago major			6.6	1.0		
Senecio sp.			6.6	1.0		
Solidago canadensis					95.0	10.6
Solidago graminifolia					40.0	4.4
Aster simplicifolius					15.0	1.7
Potentilla simplex					10.0	1.1
Prunella vulgaris					10.0	1.1
Verbascum thapsus					5.0	0.6
Vicia sp.					5.0	0.6
Alnus rugosa					5.0	0.6
Dactylis glomerata					5.0	0.6
Vitis [illegible]					5.0	0.6
Populus tremuloides					5.0	0.6
Crataegus [illegible]					5.0	0.6
Salix [illegible]					5.0	0.6
Average Community Ground Layer Cover	40%		48%		41%	

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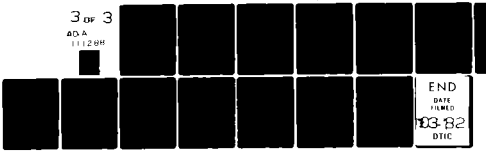


Phytosociological data summary of the shrub stratum in the Moist Old Field (SA 8) at the proposed disposal site, Rubicon Township, Huron County, Michigan, June 1978

Species	Frequency	Relative Frequency	Density (stems/ha)	Relative Density	% Ground Cover	Relative Dominance	Importance Value
Fraxinus pennsylvanica	100.0	53.3	30958	89.7	11.5	69.3	212.4
Cornus stolonifera	62.5	33.3	3252	9.4	2.3	14.0	56.8
Crataegus sp.	12.5	6.6	27	0.0	2.5	15.1	21.9
Salix interior	12.5	6.6	269	0.7	0.2	1.5	8.9
Totals[a]			34506		16.6		

[a]Columns may not sum exactly due to computer rounding.

. Phytosociological data summary of the ground layer in the Shrub-Carr (SA 4) at the proposed disposal site, Rubicon Township, Huron County, Michigan, May, June, and September 1978.

Species	May		June		September	
	Frequency	Relative Frequency	Frequency	Relative Frequency	Frequency	Relative Frequency
Poa sp.	96.0	28.6				
Solidago sp.	88.0	26.2	75.0	21.4		
Fragaria virginiana	40.0	11.9	15.0	4.3	15.0	3.0
Taraxacum officinale	32.0	9.5	35.0	10.0		
Fraxinus pennsylvanica	16.0	4.8	15.0	4.3	25.0	5.1
Achillea millefolium	12.0	3.6			5.0	1.0
Carex crinata	12.0	3.6				
Cornus stolonifera	12.0	3.6			30.0	6.1
Juncus bufonius	8.0	2.4	15.0	4.3	30.0	6.1
Plantago sp.	4.0	1.2				
Carex lacustris	4.0	1.2	10.0	2.9	15.0	3.0
Carex sp.	4.0	1.2	5.0	1.4	50.0	10.1
Cirsium arvense	4.0	1.2				
Carex gracilis	4.0	1.2			5.0	1.0
Poa compressa			55.0	15.7	40.0	8.0
Carex projecta			30.0	8.5	15.0	3.0
Poa pratensis			25.0	7.1	45.0	9.0
Phleum pratense			15.0	4.3	15.0	3.0
Geum laciniatum			10.0	2.9		
Calamagrostis canadensis			10.0	2.9	40.0	8.0
Rumex acetosella			5.0	1.4		
Labiatae			5.0	1.4		
Inula helenium			5.0	1.4	35.0	7.0
Carex lupiformis			5.0	1.4	5.0	1.0
Plantago major			5.0	1.4		
Armoracia rusticana			5.0	1.4	5.0	1.0
Trifolium repens			5.0	1.4		
Aster lateriflorus					65.0	13.1
Solidago canadensis					30.0	6.1
Lycopus uniflorus					10.0	2.0
Parthenocissus quinquefolia					5.0	1.0
Verbena hastata					5.0	1.0
Potentilla anserina					5.0	1.0
Average Community Ground Layer Cover	29%		45%		44%	

Phytosociological data summary of the shrub stratum in the Shrub-Carr (SA 4) at the proposed disposal site, Rubicon Township, Huron County, Michigan, June 1978.

Species	Frequency	Relative Frequency	Density (stems/ha)	Relative Density	% Ground Cover	Relative Dominance	Importance Value
Fraxinus pennsylvanica	100.0	45.5	19512	76.3	25.7	43.1	164.9
Cornus stolonifera	100.0	45.5	5781	22.6	33.1	55.7	123.7
Ulmus americana	20.0	9.0	287	1.1	0.7	1.2	11.4
Totals[a]			25580		59.5		

[a] Columns may not sum exactly due to computer rounding.

Phytosociological data summary of the ground layer in the Ash Swamp (SA 5) at the proposed disposal site, Rubicon Township, Huron County, Michigan, May, June and September 1978.

Species	May		June		September	
	Frequency	Relative Frequency	Frequency	Relative Frequency	Frequency	Relative Frequency
Poa sp.	60.0	24.2	10.0	2.3		
Impatiens sp.	36.0	14.5	40.0	9.2	20.0	3.6
Lysimachia nummularia	32.0	12.9	80.0	18.4	90.0	16.4
Graminede	24.0	9.6	35.0	8.0		
Carex cristatella	24.0	9.6				
Sium suave	16.0	6.4	45.0	10.3	25.0	4.5
Cardamine bulbosa	16.0	6.4				
Onoclea sensibilis	8.0	3.2	15.0	3.4	5.0	0.9
Caltha palustris	8.0	3.2				
Solanum dulcamara	8.0	3.2	30.0	6.9	30.0	5.5
Lemna sp.	4.0	1.6	75.0	17.2	35.0	6.3
Ranunculus septentrionalis	4.0	1.6				
Scirpus sp.	4.0	1.6				
Equisetum arvense	4.0	1.6				
Glyceria striata			20.0	4.6	55.0	10.0
Alisma plantago-aquatica			15.0	3.4	30.0	5.5
Poa palustris			15.0	3.4	5.0	0.9
Carex lupulina			15.0	3.4	10.0	1.8
Bidens sp.			10.0	2.3		
Galium sp.			5.0	1.1		
Glyceria borealis			5.0	1.1	5.0	0.9
Carex projecta			5.0	1.1		
Carex vulpinoidea			5.0	1.1		
Polygonum sp.			5.0	1.1		
Carex lacustris			5.0	1.1		
Betula papyrifera					80.0	14.5
Acer rubrum					55.0	10.0
Bidens cernua					35.0	6.3
Polygonum natans					20.0	3.6
Lycopus canadensis					20.0	3.6
Polygonum hydropiperoides					15.0	2.7
Cirsium arvense					5.0	0.9
Typha latifolia					5.0	0.9
Carex sp.					5.0	0.9
Average Community Ground Layer Cover	19%		58%		54%	

Phytosociological data summary of the shrub stratum in the Ash Swamp (SA 5) at the proposed disposal site, Rubicon Township, Huron County, Michigan, June 1978.

Species	Frequency	Relative Frequency	Density (stems/ha)	Relative Density	% Ground Cover	Relative Dominance	Importance Value
Fraxinus pennsylvanica	20.0	66.7	215	47.4	0.4	50.0	164.0
Acer rubrum	10.0	33.3	239	52.6	0.4	50.0	136.0
Totals[a]			454		0.8		

[a]Columns may not sum exactly due to computer rounding.

Phytosociological data summary of saplings in the Ash Swamp (SA 5) at the proposed disposal site, Rubicon Township, Huron County, Michigan, June 1978.

Species	Frequency	Relative Frequency	Relative Density	Basal Area (m^2/ha)	Relative Dominance	Importance Value
Fraxinus pennsylvanica	100.0	76.9	92.5	0.7	94.1	263.5
Ulmus americana	30.0	23.1	7.5	0.0	5.9	36.5
Total[a]				0.8		

[a]Columns may not sum exactly due to computer rounding.

Phytosociological data summary of trees in the Ash Swamp (SA 5) at the proposed disposal site, Rubicon Township, Huron County, Michigan, June 1978.

Species	Frequency	Relative Frequency	Relative Density	Basal Area (m^2/ha)	Relative Dominance	Importance Value
Fraxinus pennsylvanica	100.0	95.2	98.8	33.4	99.6	293.5
Acer saccharinum	5.0	4.8	1.2	0.1	0.4	6.4
Total[a]				33.5		

[a] Columns may not sum exactly due to computer rounding.

Density (stems/ha) of saplings and trees by diameter class in the Ash Swamp (SA 5) at the proposed disposal site, Rubicon Township, Huron County, Michigan, June 1978.

Species	Diameter Classes dbh (cm)											
	Sapling Class			Tree Class								
	2.5-6.2	6.3-10.0	Sub-total	10.1-17.5	17.6-25.0	25.1-32.5	32.6-40.0	40.1-47.5	47.6-55.0	> 55.1	Sub-total	Totals
[illegible]	65.9	114.7	180.6	276.1	133.6	151.4	106.9	35.6			703.6	884.2
[illegible]	9.8	4.9	14.6								0.0	14.6
[illegible]			0.0	8.9							8.9	8.9
Totals[a]	75.6	119.6	195.2	285.0	133.6	151.4	106.9	35.6	0.0	0.0	712.5	907.7
				28901	43416	78216	118856	59168	0	0		331064
Biomass (kg/ha)	426	2281		995	1932	3271	4945	1283	0	0		11635
Productivity (kg/ha/yr)	68	41										

[a] Columns may not sum exactly due to computer rounding.

Observed distribution of resource species recorded at the proposed disposal site, Rubicon Township, Huron County, Michigan.

Resources Species	Sampling Area		
	Cattail Marsh	Shrub-Carr	Ash Swamp
Mammals			
Eastern cottontail		X	
Woodchuck		X	
Gray squirrel		X	X
Fox squirrel		X	X
Muskrat	X		
Raccoon	X	X	X
White-tailed deer	X	X	X
Birds			
Mallard		X	X
Blue-winged Teal		X	
Wood Duck		X	
Bufflehead		X	
Ring-necked Pheasant		X	
Virginia Rail	X		
Sora	X		
Common Snipe			X
Mourning Dove	X	X	

Miscellaneous mammal observations from three sampling areas at the proposed disposal site, Rubicon Township, Huron County, Michigan, April 1978 through January 1979.

Location/Species	Date	Number	Observations and/or Sign
Cattail Marsh (SA 2)			
Microtus pennsylvanicus (Meadow vole)	5 June	1	Sight
Ondatra zibethicus (Muskrat)	26 April	3	Huts (not active)
Procyon lotor (Raccoon)	26 April	1	Scat
Procyon lotor (Raccoon)	17 May	1	Scat
Procyon lotor (Raccoon)	5 June	2	Scat
Odocoileus virginianus (White-tailed deer)	16 May	3	Sight
Odocoileus virginianus (White-tailed deer)	12 September	1	Sight
Odocoileus virginianus (White-tailed deer)	23 January	Abundant	Tracks
Shrub-carr (SA 1)			
Sylvilagus floridanus (Eastern cottontail)	27 April	1	Sight
Sylvilagus floridanus (Eastern cottontail)	17 May	2	Sight
Sylvilagus floridanus (Eastern cottontail)	7 June	1	Sight
Marmota monax (Woodchuck)	6 June	1	Den
Sciurus carolinensis (Gray squirrel)	27 April	2	Sight
Sciurus niger (Fox squirrel)	27 April	1	Sight
Sciurus niger (Fox squirrel)	14 September	1	Sight
Tamiasciurus hudsonicus (Red squirrel)	23 October	1	Sight
Microtus pennsylvanicus (Meadow vole)	5 June	1	Sight
Procyon lotor (Raccoon)	6 June	1	Tracks
Procyon lotor (Raccoon)	14 September	1	Tracks
Odocoileus virginianus (White-tailed deer)	15 May	1	Tracks
Odocoileus virginianus (White-tailed deer)	5 June	1	Sight/Tracks
Odocoileus virginianus (White-tailed deer)	14 September	1	Tracks
Odocoileus virginianus (White-tailed deer)	21 October	1	Tracks
Odocoileus virginianus (White-tailed deer)	23 January	1	Sight/Tracks
Odocoileus virginianus (White-tailed deer)	24 January	3	Sight

Location/Species		Date	Number	Observations and/or Sign
Ash Swamp (SA 5)				
Condylura cristata	(Star-nosed mole)	12 September	1	Sight (dead)
Sciurus carolinensis	(Gray squirrel)	28 April	1	Sight
Sciurus niger	(Fox squirrel)	28 April	1	Sight
Sciurus spp.	(Squirrel)	25 January	Abundant	Tracks
Microtus pennsylvanicus	(Meadow vole)	6 June	1	Sight
Procyon lotor	(Raccoon)	26 April	1	Den
Procyon lotor	(Raccoon)	8 June	1	Scat
Odocoileus virginianus	(White-tailed deer)	28 April	4	Sight
Odocoileus virginianus	(White-tailed deer)	19 May	1	Sight
Odocoileus virginianus	(White-tailed deer)	5 June	1	Sight (dead)
Odocoileus virginianus	(White-tailed deer)	6 June	1	Sight
Odocoileus virginianus	(White-tailed deer)	7 June	1	Sight
Odocoileus virginianus	(White-tailed deer)	13 September	3	Sight
Odocoileus virginianus	(White-tailed deer)	14 September	4	Sight
Odocoileus virginianus	(White-tailed deer)	23 January	Abundant	Tracks
Odocoileus virginianus	(White-tailed deer)			

Small mammal species list and captures per 100 trap nights from the proposed disposal site, Rubicon Township, Huron County, Michigan, June and September 1978.

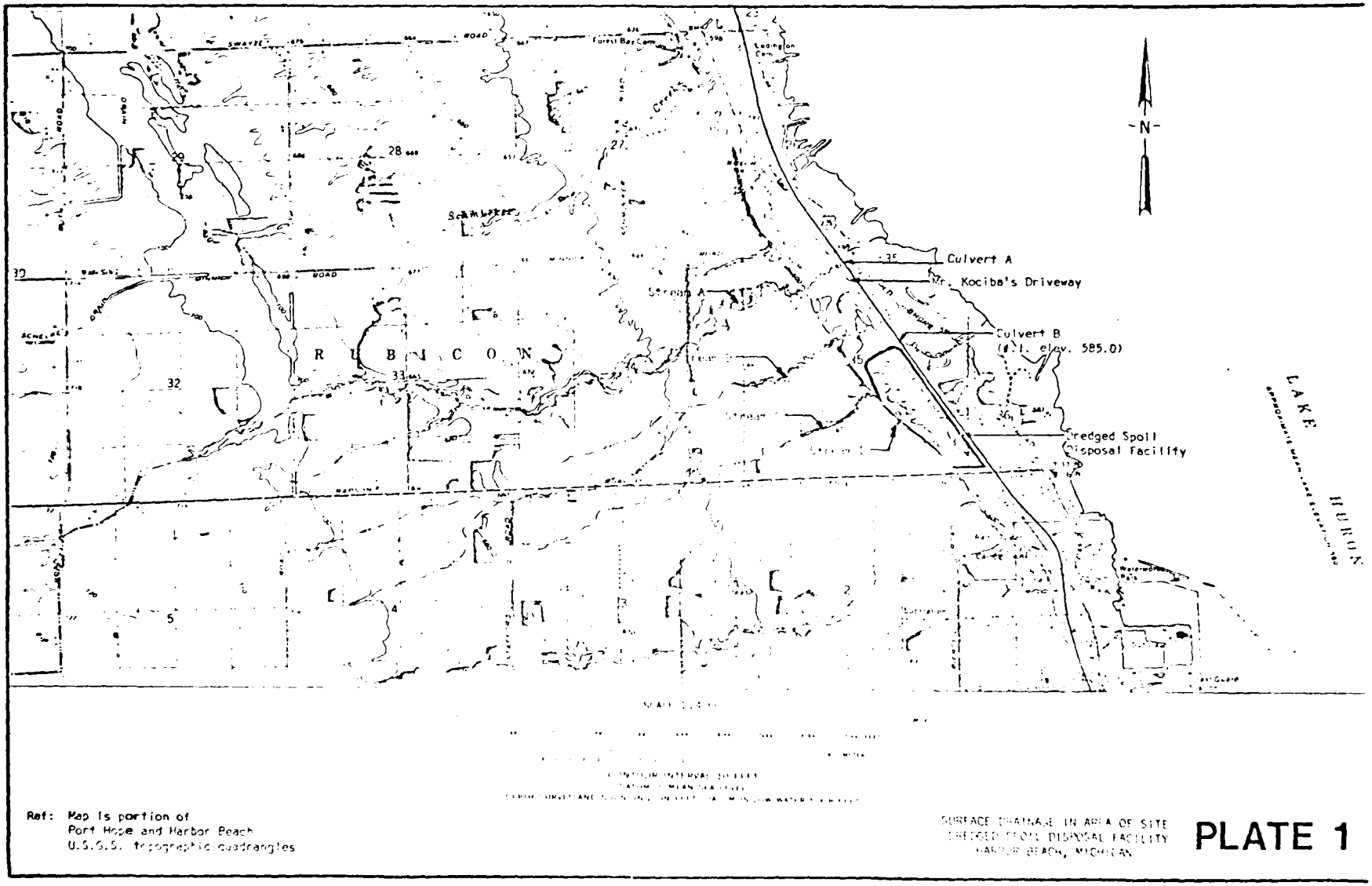
Species	Cattail Marsh		Shrub-Carr		Ash Swamp		Total		Relative Frequency	
	Jun	Sep	Jun	Sep	Jun	Sep	Jun	Sep	Jun	Sep
Blarina brevicauda (Short-tailed shrew)	--	0.50	--	0.25	--	0.25	--	0.30	--	20.0
Peromyscus leucopus (White-footed mouse)	--	--	--	0.25	--	1.25	--	0.60	--	40.0
Microtus pennsylvanicus (Meadow vole)	--	1.50	0.25	--	--	0.25	0.10	0.40	50.0	26.7
Zapus hudsonius (Meadow jumping mouse)	--	--	0.25	0.50	--	--	0.10	0.20	50.0	13.3
Community Totals	0.00	2.00	0.50	1.00	0.00	1.75	0.20	1.50	100.0	100.0

APPENDIX 6

MAPS

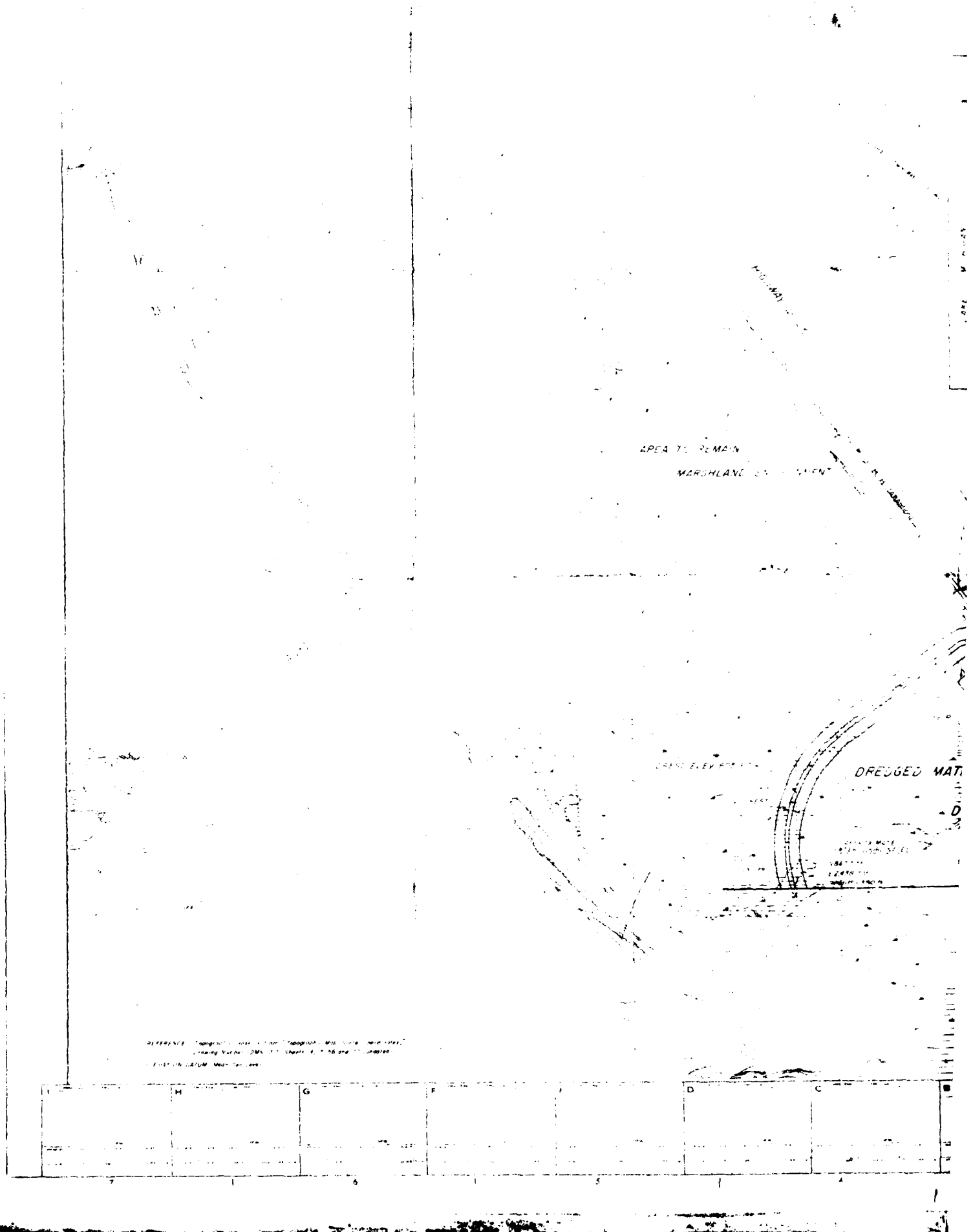
STATE OF MICHIGAN

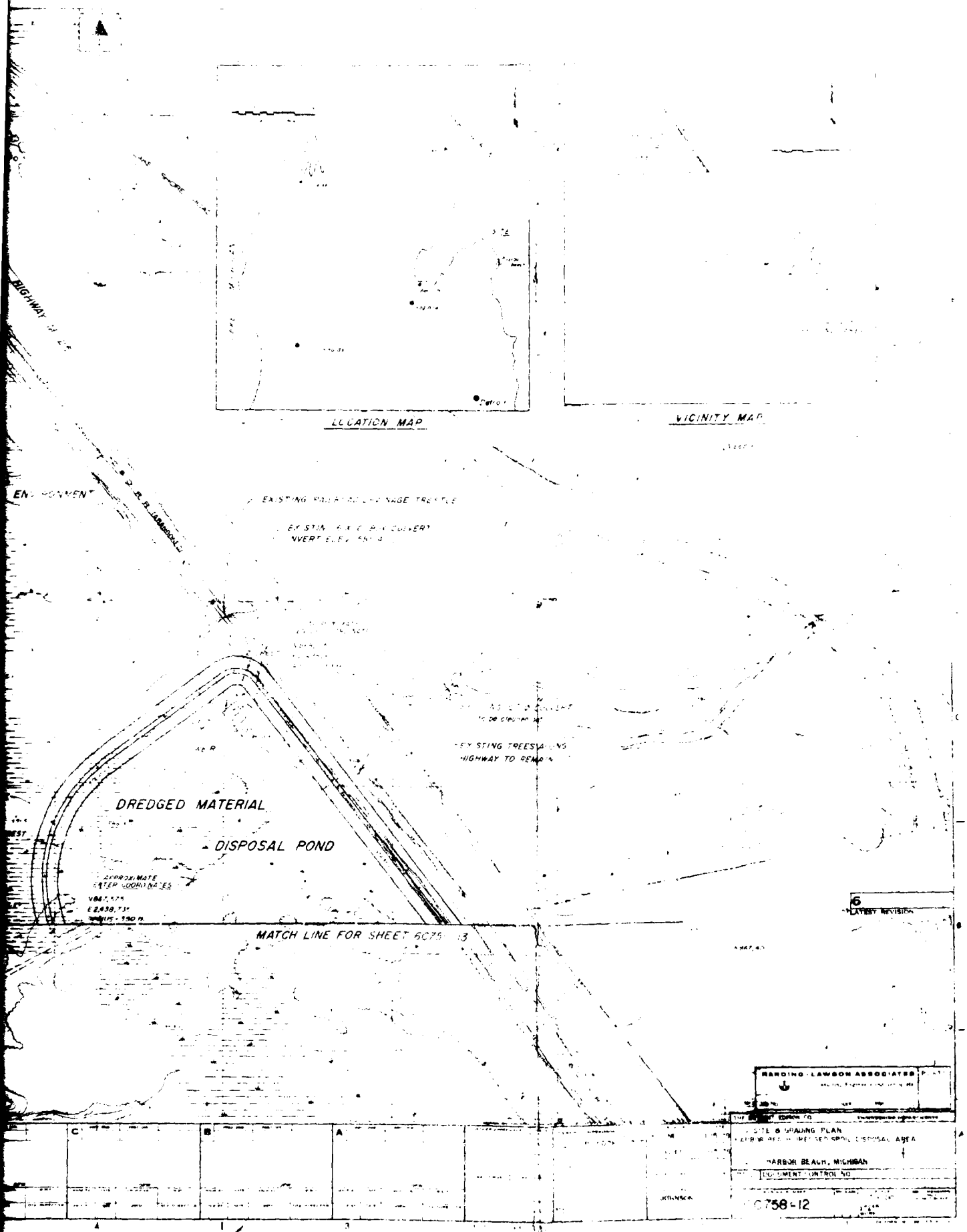
HARBOR BEACH QUADRANGLE
MICHIGAN-HURON CO
7.5 MINUTE SERIES (TOPOGRAPHIC)

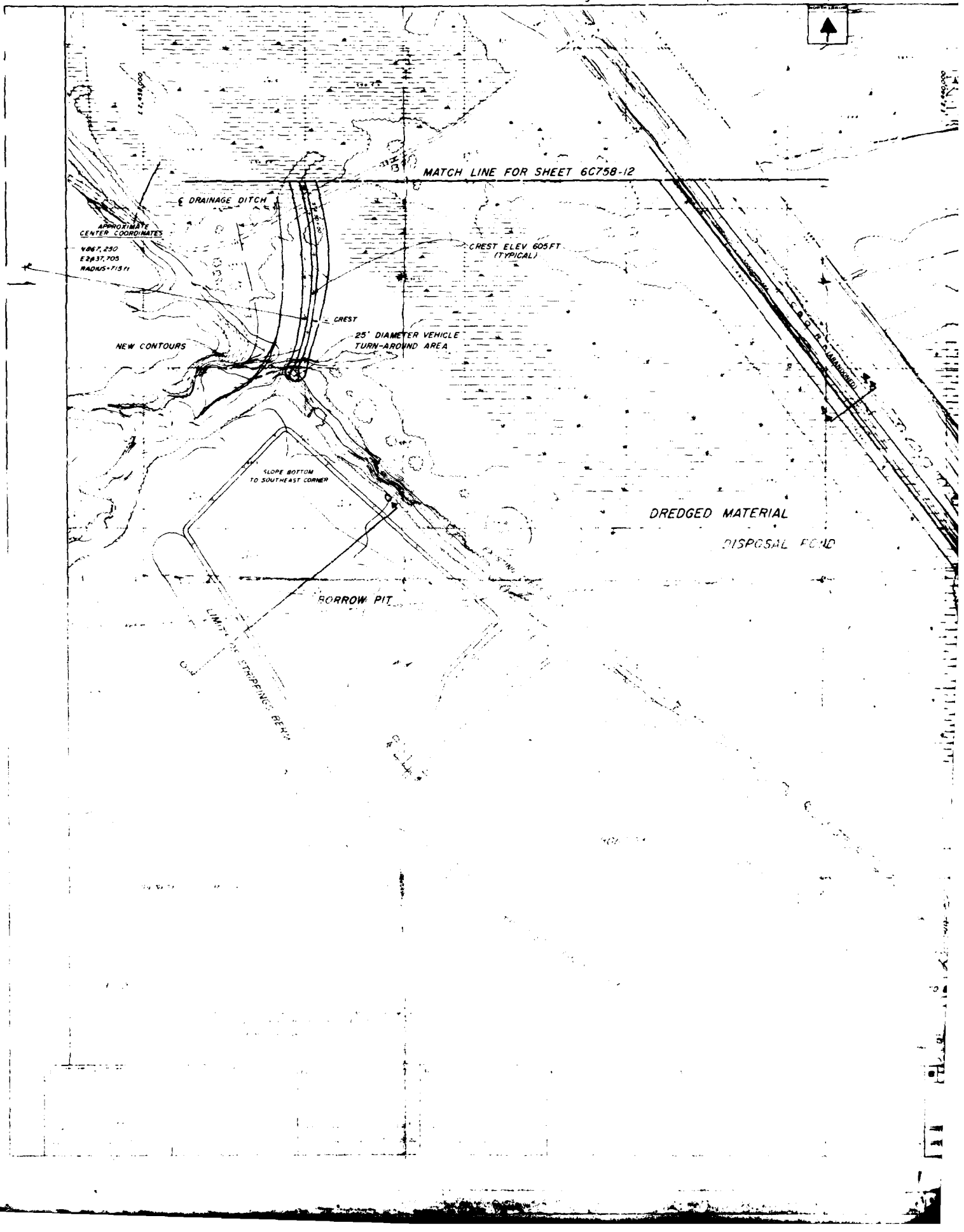


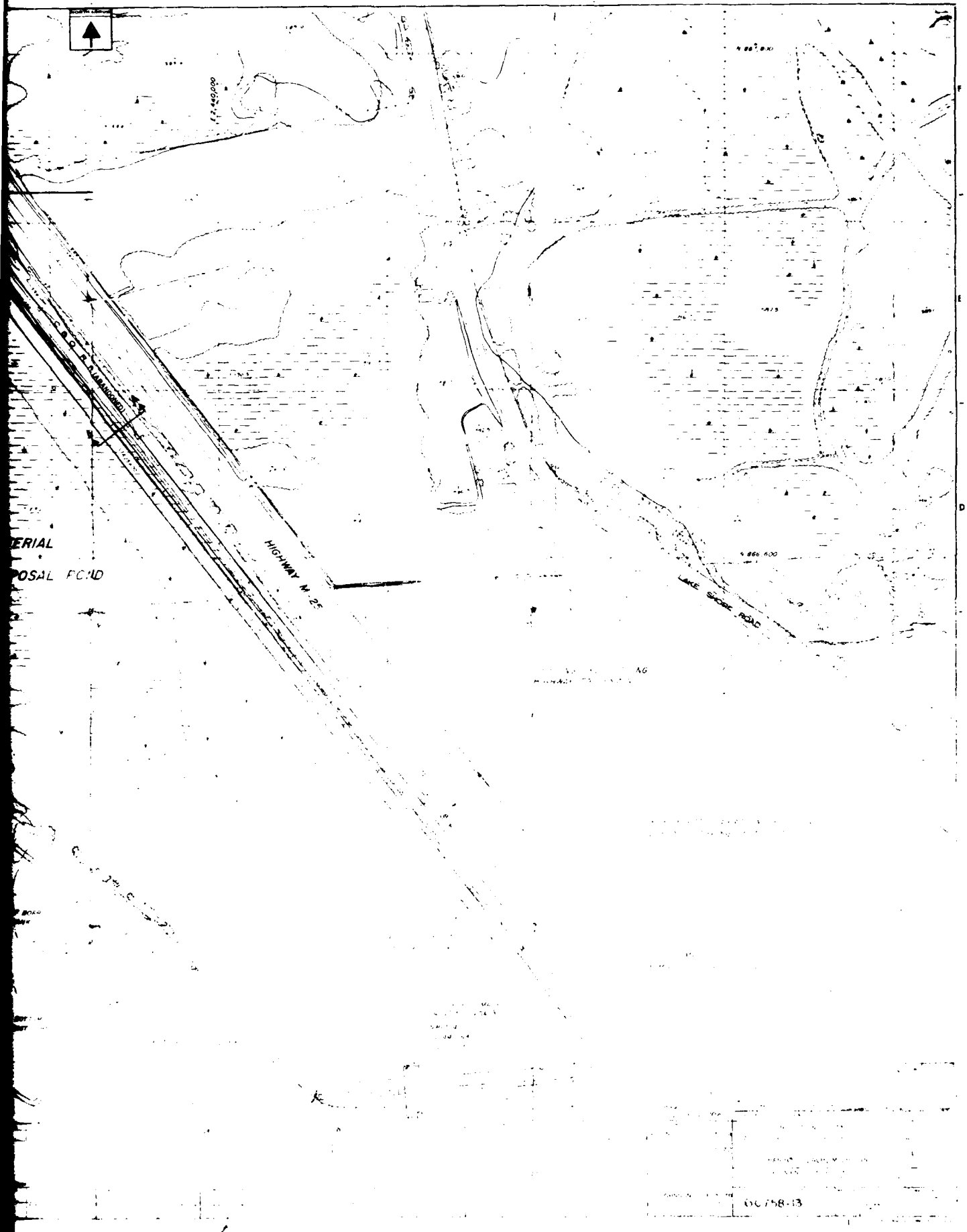
SURFACE DRAINAGE IN AREA OF SITE
DREDGED SPOIL DISPOSAL FACILITY
HARBOR BEACH, MICHIGAN

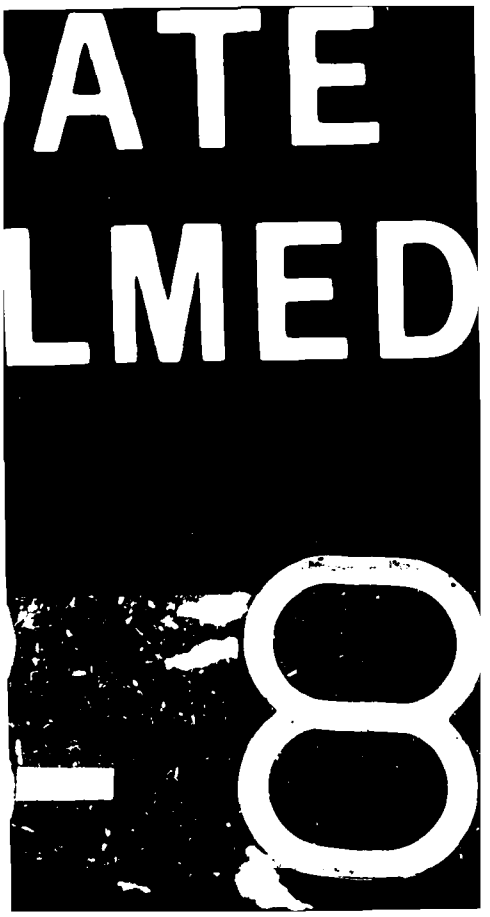
PLATE 1


AREA TO REMAIN
MARSHLAND
DREDGED MAT


LOCATION MAP
VICINITY MAP
DREDGED MATERIAL
DISPOSAL POND
MATCH LINE FOR SHEET 6075-13
EXISTING TREES ALONG HIGHWAY TO REMAIN
6
LATEST REVISION
HARDING-LAWSON ASSOCIATES
SITE & GRADING PLAN
HARBOR BEACH, MICHIGAN
DOCUMENT CONTROL NO.
C758-12


MATCH LINE FOR SHEET 6C758-12
℄ DRAINAGE DITCH
APPROXIMATE CENTER COORDINATES
N967,250
E2837,705
RADIUS=715'11
CREST ELEV 605FT (TYPICAL)
CREST
NEW CONTOURS
25' DIAMETER VEHICLE TURN-AROUND AREA
SLOPE BOTTOM TO SOUTHEAST CORNER
DREDGED MATERIAL
DISPOSAL POND
BORROW PIT
LIMITS OF STRIPPING BERM


HIGHWAY M-28
LAKE SHORE ROAD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